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COMPETITION FROM THE RAILROADS.

LEADING TRUNK LINES HAVE HAD A LARGE BUSINESS OUT OF CHICAGO THIS YEAR—IT IS DUE PARTLY TO HIGH LAKE FREIGHTS, BUT MODERN HIGH-POWERED LOCOMOTIVES AND INCREASE OF CAR EQUIPMENT WILL BE A NEW FACTOR IN THE SITUATION.

During five or six years past the eastbound movement of freight of all kinds from Chicago, as reported by the Chicago Board of Trade, has averaged in the lake navigation period—May to November inclusive—about 5,500,000 net tons. Grain is, of course, the principal item in this freight. In all these years the vessels have had about 65 per cent of the grain trade. This year the situation has been reversed. Reports for the full season will very probably show that the railroads have had full 65 per cent of the business, if not more. It will, of course, be understood at once that the change was due largely to the great demand for ships to carry ore, coal, lumber, etc., which resulted in rates fully three times as high as the contract figures of early spring. From the vessel standpoint it may be said that there would be no such gain for the railways if they were compelled to meet a 1-cent grain freight from Chicago to Buffalo, at which the large vessels can make some money, instead of the 3-cent rate that prevailed throughout the greater part of the season on account of the general activity in lake trade. In other words, it will be claimed from a vessel point of view that the railroads secured the grain because it was impossible to get vessels to move it, even at 3 cents.

However this may be, it is quite evident that the railroads are undergoing improvements that will have an important bearing on the Chicago business and which should have the attention of the vessel interests. One of the managers of a leading trunk line declared, only a few days ago, in discussing this subject, that they were after the Chicago grain business and that modern high-powered locomotives with a big increase in car equipment would enable them to meet vessel competition as they had never been able to meet it in the past. He was referring to the action of the iron ore interests in securing the great bulk of lake vessel capacity for next season and the fear that few of the ships would be left for the grain trade. The railroads would care for the grain trade, he said, to a far greater extent than in the past. When questioned as to the proposed Erie canal enlargement with the facilities which it would provide in canal boats three or four times the size of those now in use, he was willing to concede the advantages that would accrue to the water route from an enlarged Erie canal, but he was not, of course, concerned on that score, in view of the demoralized condition of New York state canal affairs.

A representative of large vessel interests in Buffalo, who is well posted on everything pertaining to the lake trade, adds interest to the above discussion by giving to the Review his views along similar lines. He says:

"In connection with this matter of railway competition, it has been claimed this season that the railway managers deliberately refused grain from Buffalo with a view to putting the cars into Chicago so as to more effectively compete with the lake route. I have seen nothing to warrant such a charge. The trouble this season has been due to the very great scarcity of cars in every line of rail transportation. The shortage in Buffalo is to some extent due to the fact that the seaboard terminals are filled with grain as are the elevators at Buffalo, and there are many thousands of cars at those ports, which can not be unloaded, as there appears to be a scarcity of ships to take the grain from the seaboard. It is said that the war in South Africa is also to some extent the contributing cause, as it has called for a great many ships to transport men and material to South Africa, a comparatively long voyage which consumes a good deal of time. These conditions, in addition to a generally good demand for ships in other lines of sea-going trade, account for the drawbacks of the present season. As an evidence of the scarcity of cars, it may be noted that although steamboat fuel is selling at \$2.50 a ton, a higher price than it has brought in a number of years, it is very hard to bring enough fuel to the docks here to supply the trade, and I understand that the same conditions exist at other ports. We are told that at every way station along the railways from Buffalo east, there are large quantities of fruits, vegetables and other perishable goods for which cars cannot be secured, and if that is the case it is not surprising that cars are scarce for the grain trade. Another point in evidence on the score of the present car shortage and the inability of the railways to compete with water rates when normal conditions prevail, is found in the matter of canal rates. Up to the past month, when it has been impossible to get cars to move the grain, the canal rates were at the lowest point ever known—2¾ cents for wheat and perhaps as low as 2½ cents—and our shipments by canal this year will be the smallest in a great many years. Canal freights are now 5 cents, but that is because the railroads cannot get cars to move the grain.

"The railroad people are undoubtedly right in the claim that in the future they will get a much larger part of the east-bound grain business from Chicago than they have been getting in the past. They can undoubtedly haul the grain cheaper with their big cars, powerful locomotives and other improvements, than they have been able to haul heretofore. Doubtless by the opening of navigation next year, after having an all-winter drain on the grain, and with the winter fleet of vessels also loaded, the railways will be in evidence as competitors for the Chicago trade. Especially will this be the case when the summer dullness comes on. While it is a much longer haul from Duluth to the seaboard by rail than from Chicago, there is a very large part of the grain producing territory that is contributory to both of those ports, and whether the grain will go to Duluth or Chicago will depend to a great extent upon what the rates are east of Chicago. As for myself I am not at all bullish in my views on the

outlook for next season's business, outside of what has already been done at liberal rates on iron ore. Buffalo's receipts of grain by lake, including flaxseed, last year were about 222 million bushels. This year they will probably not reach 170 millions. The late opening of navigation last spring and the grain shovellers strike, which lasted three and a half weeks, contributed somewhat to the reduction in grain traffic by lake, but the high rates of freight undoubtedly caused the diversion of a large amount of the grain to the railroads.

"Shipments of coal by lake next season will undoubtedly be much larger than usual, for the reason that there will be a shortage of soft coal in the northwest and perhaps no surplus of hard coal. Naturally another season the coal dealers will guard against this condition and if they can do so conveniently will lay in more coal than they have any use for. But in this trade the railroad also comes into play when high rates are reached. Coal freights from Buffalo to Chicago and Milwaukee have since Sept. 5 last been \$1 a ton. (Just now reduced). The all-rail rate, taking into account the cost of handling the coal at Buffalo and at Chicago and Milwaukee, switching charges, breakage, etc., is only equal to a 70-cent lake freight. The dollar rate could never have been made or maintained if there had been cars enough to do the business, or even a large part of the business. I mention this as further evidence of the importance of the car question which the railroads hope to solve shortly."

LAKE FREIGHT MATTERS.

It is certainly not to the advantage of the vessel interests of the great lakes that the present season should close with ore rates on a dollar basis from the head of Lake Superior, or 25 cents below the figure at which contracts for millions of tons of iron ore to be moved next year have been made. Still there is more of next year's ore to be had at \$1.25 from the head of the lakes, and Duluth grain shippers are offering 3 cents for opening shipments to Buffalo in 1900, although paying only 2½ cents now. The slump in rates during the past few weeks is, of course, due almost entirely to the fact that great quantities of grain in the west, which it was expected would move this fall, is now being sold and remains in elevators and in farmers' hands. To the vessel owner the question of how much of this grain will be moved by railroads during the winter is quite important. The ships will get a large part of it next spring, no matter what the extent of the rail movement may be, but the vessel owners are, nevertheless, congratulating themselves that the pace for next year was set at \$1.25 a ton before the present decline in rates was inaugurated. They are still thanking John D. Rockefeller for the move he made a few weeks ago, on account of his transportation lines outweighing other interests. It is now certain that if it were not for the stand taken by Mr. Rockefeller's representatives immediately upon the opening up of negotiations for next year, the vessel owners would undoubtedly be carrying ore in 1900 at \$1 and very probably at 90 cents, instead of the \$1.25 rate at which the business is now closed up.

The announcement from Pittsburg of the formation of the Pittsburg Steamship Co. very probably means that the Carnegie-Oliver vessels are to be operated under that name. In vessel circles there was no need of a denial of the report that the Carnegie interest intended opening up a ship yard on the lakes. Such a move was not considered at all probable, as the American Ship Building Co., a big, strong corporation that is here to stay, is a very large buyer of material from the Carnegie company and the same is true also of ship builders on the lakes who are not connected with the consolidation.

NAVAL ARCHITECTS AND MARINE ENGINEERS.

Special Dispatch to the Marine Review.

New York, Nov. 16.—At a meeting of the council of the Society of Naval Architects and Marine Engineers, preliminary to the reading and discussion of papers at the general meeting of the organization now under way, about 100 new members were elected. The society is most prosperous in every way with a very bright future on account of increasing interest in shipping and naval affairs throughout the country. Admiral Sampson was placed on the list of vice-presidents, succeeding Gen. T. W. Hyde of the Bath Iron Works, who has been in very poor health for some time past. Mr. W. I. Babcock, general manager of the Chicago Ship Building Co., was elected a member of the council to succeed Admiral Sampson. The place of Wm. H. Webb of New York, whose death was announced a few days ago, was left vacant. Mr. Webb was first vice-president. The new list of officers is as follows:

President—Clement A. Griscom.

Vice-Presidents—Charles H. Cramp, Philip Hichborn, Chas. H. Loring, George W. Melville, George W. Quintard, Irving M. Scott, Frank L. Fernald, Francis M. Bunce, Wm. T. Sampson, Edwin A. Stevens.

Members and Associate Members of the Council—Wm. F. Durand, Francis T. Bowles, French E. Chadwick, H. Taylor Gause, Nathaniel G. Herreshoff, William H. Jacques, John C. Kafer, Frank B. King, Frank E. Kirby, Jacob W. Miller, Washington L. Capps, Edward Farmer, Lewis Nixon, Harrington Putnam, W. I. Babcock, Horace See, E. Platt Stratton, Stevenson Taylor, George E. Weed, James E. Denton, Walter M. McFarland, Geo. W. Dickie, Cecil H. Peabody.

Executive Committee—Francis T. Bowles, Chairman; H. T. Gause, Harrington Putnam, Lewis Nixon, Edwin A. Stevens, Clement A. Griscom, Ex-officio.

Secretary and Treasurer—Francis T. Bowles, U. S. N., 12 W. 31st st., New York.

MERCHANT MARINE IN THE FOREIGN TRADE.

BY CLEMENT A. GRISCOM,

PRESIDENT OF THE INTERNATIONAL NAVIGATION CO.

Questions Submitted by the Marine Review.

1. Shall the United States continue to allow its merchant marine in foreign trade to fight a losing battle until it entirely passes out of existence and foreign nations absorb the ocean carrying of our entire import and export trade?

2. Shall the United States decide, as its permanent non-partisan public policy, that an equitable share of its imports and exports must be carried on vessels of the United States, built in our own ship yards and flying our own flag, and that congress will enact whatever national legislation may be needed to stimulate and encourage our citizens to create, maintain and operate the vessels this policy calls for?

3. If it is recommended that congress shall enact remedial legislation, what shall it be, and why?

Editor Marine Review: There can be but one answer, an emphatic "no," to your first inquiry: "Shall the United States continue to allow its merchant marine in foreign trade to fight a losing battle until it entirely passes out of existence and foreign nations absorb the ocean carrying of our entire import and export trade?" From natural advantages and intelligent legislation our agriculture, manufactures and internal commerce have grown to most satisfactory and formidable proportions. Navigation, the fourth pillar of our prosperity, in so far as over-sea trade is concerned, has become a foreign prop, which disfigures the national structure and is a most uncertain support in time of need. If we wish to be a symmetrically powerful nation of the first class we must turn our attention to our merchant marine. The country is like an athlete, developed in trunk and limbs, but with a broken and helpless right arm.

Second: With equal emphasis it may be stated that the United States should decide as its permanent non-partisan public policy that an equitable share of its imports and exports must be carried on vessels of the United States, built in our own ship yards and flying our own flag and that congress should enact whatever national legislation may be needed to stimulate and encourage our citizens to build, maintain and operate the vessels this policy calls for.

To be permanent a policy in this country must commend itself to the most liberal and intelligent thought of both parties. Our navigation is distinguished from all other industries, for it is distinctly national, not local. Our shipping in foreign trade competes solely with foreign shipping, and any equitable measure to increase American ships is a measure to strengthen the United States as a nation and to improve transportation facilities from which the whole country will derive benefit. A shipping bill is for the general welfare.

National navigation is a necessity to the public defence. There are millions of strong and easily trained arms, ready to defend the country on land. On the sea we must have ships and the men to navigate them, and these are not to be had for the asking in a day or a month. The fathers of the Republic believed that they had in the merchant marine left to us ample means to supplement the navy in defending the country at sea. We have allowed it so to shrivel that in our war with Spain we lacked the vessels to transport our troops to the scenes of action, and were forced to buy vessels, under foreign flags, manned with foreign crews to conduct our military operations. A few days ago a steamship, bringing to their homes our soldiers from Manila, was stopped at Hong Kong because she was a British vessel and had failed to comply with some British regulations. Out of courtesy to our government the steamer was released and allowed to proceed on her way. Trifling as the incident was in itself, it is the evidence of a state of dependence, inconsistent with our rank among nations, and mortifying to men of all parties.

A necessity in time of war, a powerful merchant marine is also one of the best assurances of peace. "It is commerce," said John Stuart Mill, "which is rapidly rendering war obsolete, by strengthening and multiplying the personal interests which are in natural opposition to it," and he added: "It may be said without exaggeration that the great extent and rapid increase of international trade, in being the principal guarantee of the peace of the world, is the great permanent security for the uninterrupted progress of the ideas, the institutions and the character of the human race."

These are considerations which appeal with as much force to the Democrat as to the Republican, to the ultra believer in the doctrine of laissez-faire as to the believer in protection. To the latter the value of our foreign carrying trade, worth doubtless \$200,000,000 annually, and the development of ship building, with its subsidiary industries of boiler and machinery building, and so on through lines of activity until the mine and the forest are reached, furnish additional reasons for the adoption of the permanent maritime policy to which you refer.

I have not been able to refrain from noting a few general matters, which take the subject, in my opinion, out of the range of legislation for the benefit of one industry. Doubtless you have done me the honor to address your inquiries to me, however, as one identified with American shipping, and you probably desire more particularly a reply to your third question: "What remedial legislation should congress enact?"

A bill was introduced at the last session of congress by Senator Hanna of Ohio, and Representative Payne of New York, and with amendments reported by Senator Frye of Maine, known as Senate bill 5590. In the favorable report of the bill the Republican senators were joined by the Democratic senators of the two great maritime states, Senator Murphy of New York, and Senator White of California. Among its advocates be-

fore the committees of congress were the distinguished democratic candidate for vice president, the Hon. Arthur Sewall of Maine, and Mr. James J. Hill of Minnesota, one of the most influential Democrats and most enterprising citizens of the northwest. The bill has been earnestly favored by Democratic as well as by Republican newspapers, and it should be said that such opposition in the press as it has encountered—based it seems to me on insufficient information and altogether erroneous statistics—has also been outside of party lines. As a Republican I find that it has the strongest support from Republicans because that party has always stood for progressive, constructive legislation. Those who have attacked the bill offer no alternative, which at this time stands the remotest chance of enactment. The "free ship" bill was defeated without a dissenting vote a few years ago, by the senate committee on commerce of virtually the same membership as that which reported this bill by a strong majority, to which both parties contributed. Our treaties stand like a wall in the way of even the consideration of the discriminating duties proposition. While the business interests with which I am identified would be satisfied with adequate mail pay legislation, such a measure would be obviously insufficient to promote our maritime interests generally and to provide the policy to which you refer and which the country desires. The choice, therefore, seems to be between senate bill 5590 and no legislation whatever. Because it is the only practicable measure, I favor its enactment.

It is the most carefully considered measure relating to the American merchant marine which has been presented in congress in my generation. The preparation of the bill began more than two years ago. At the suggestion of Senator Frye, whose name is more closely identified with our shipping and foreign commerce than that of any other man in our public life at present, a committee was organized in March, 1897, to investigate the subject and if possible draft a practical measure to establish the American merchant marine in foreign trade. The committee was chosen without regard to party. In it were represented steamship and sailing interests, the foreign and coasting trade, ship owners and ship builders, the Atlantic and Pacific coasts and the great lakes, business men, lawyers and legislators, those who believed in mail subsidies, in free ships, in discriminating duties, and those without any preconceived views, except as to the necessity for action. As counsel in respect to constitutional and international law, as well as to legislative forms, ex-Senator George F. Edmunds was selected, as one whose views on these matters would command the country's respect. This committee spent months in the study of different propositions, examined the laws of other nations, and investigated the conditions and difficulties of our foreign sea-borne trade. Senate bill 5590 in its fundamental propositions was the unanimous conclusion of these labors. While there are small particulars, of course, on which opinion differed the measure is not a compromise, but rather a composite bill, believed to have justification for every feature in our established national policy or in the successful methods of other maritime nations.

The difference in the cost of building ships in the United States and Great Britain and the difference in the expense of operating ships under the American and other foreign flags have been ascertained as closely as possible. These differences are to be made good, under certain conditions, to every American vessel carrying cargoes in competitive foreign trade. There is no favoritism, no trustism, involved in the measure. In the case of fast mail steamships, over 14 knots and upwards and 1,500 gross tons, or over, an additional allowance is made to offset the financial aid in various shapes allowed by nearly all foreign nations to nearly all vessels of this description. The assistance proposed is measured by the conditions in competition to be met, and is relatively no greater in the case of the large fast steamship than in the case of the smaller and slower sailing vessels. The limits which I must put to my reply to your question forbid a review of the figures in detail. The company, with which I am identified, has built and is building vessels in the United States and Great Britain, and is operating vessels under the flags of these nations, and Belgium. I feel, therefore, qualified to state that the extent of assistance proposed by senate bill 5590 is not more than sufficient to offset differences in cost of construction and operation with which I am familiar. As a safeguard the bill requires American owners to give bonds to build at home new vessels equivalent to 25 per cent of their present tonnage before they can avail themselves of the act, a proviso which involves the construction of over 200,000 tons of shipping, with an expenditure of from \$15,000,000 to \$20,000,000 in the near future in home ship yards.

The bill also provides for the registration of from 300,000 to 350,000 tons of steamships, owned by Americans but navigated under foreign flags, on the condition that the owners build an equivalent amount of tonnage in the United States, thus providing for from \$30,000,000 to \$45,000,000 further expenditure for the benefit of American labor. Outside of and much exceeding these amounts will be the expenditures on labor due to the stimulus which, in the opinion of friend and foe, the bill will give to American ship building.

What will it cost? Exaggerated estimates of the expenditure, based upon fallacious premises, have thus far been the only criticism of the bill. The Marine Review, if it has not already done so, will doubtless point out the absurdity of those widely circulated statistics. (See Alexander R. Smith in the November Forum). By the terms of the proposed bill the maximum expenditure applicable to any one year is fixed at \$9,000,000. We now spend \$1,500,000 annually for ocean mails. As the bill does away with this expenditure, the new appropriation called for at the utmost will be \$7,500,000 per annum. This amount cannot be reached for several years. Assuming that all our available registered vessels were in operation under its provisions this year, the expenditure would be about \$4,000,000, from which should be deducted about \$1,500,000 paid already for ocean mails. Between an initial new expenditure of about \$2,500,000 and the maximum new expenditure of \$7,500,000, several years must elapse, during which our ship yards will have multiplied, our shipping in foreign

trade will have increased, ocean freights will have diminished, and from being insignificant on the seas we shall have gained experience and shall be attaining rank that will make us the competitor of any nation for the ocean carrying trade. When that maximum of \$7,500,000 is reached, the benefits of the bill are to be reduced pro rata and as our shipping increases this pro rata reduction is continued automatically under the clause of the bill fixing a maximum expenditure. We shall by that time be building sea-going vessels by the wholesale, and will from that reason alone have so reduced the difference between cost of construction at home and abroad as to be able to compete, notwithstanding a rapidly diminishing extent of assistance from the government, because of all that follows a rapidly increasing industry.

These are the broad features and purposes of the bill. It has my support because I believe a merchant marine is demanded for the general welfare and common defence, because the bill is non-partisan and durable and is the most intelligent, most carefully prepared and most practical measure which has come to my knowledge. It is the only measure which seems likely to secure the approval of congress.

Philadelphia, Nov. 9, 1899.

CLEMENT A. GRISCOM.

A GREAT BATTLESHIP.

The British first-class battleship *Bulwark*, launched from Devonport dock yard a few weeks ago, has created a record in having the greatest weight built into her during the seven months that she has been in hand. She is 400 feet long on the water, 75 feet beam, 26 feet 3 inches deep forward and 27 feet 3 inches deep aft, and of 15,000 tons displacement. She

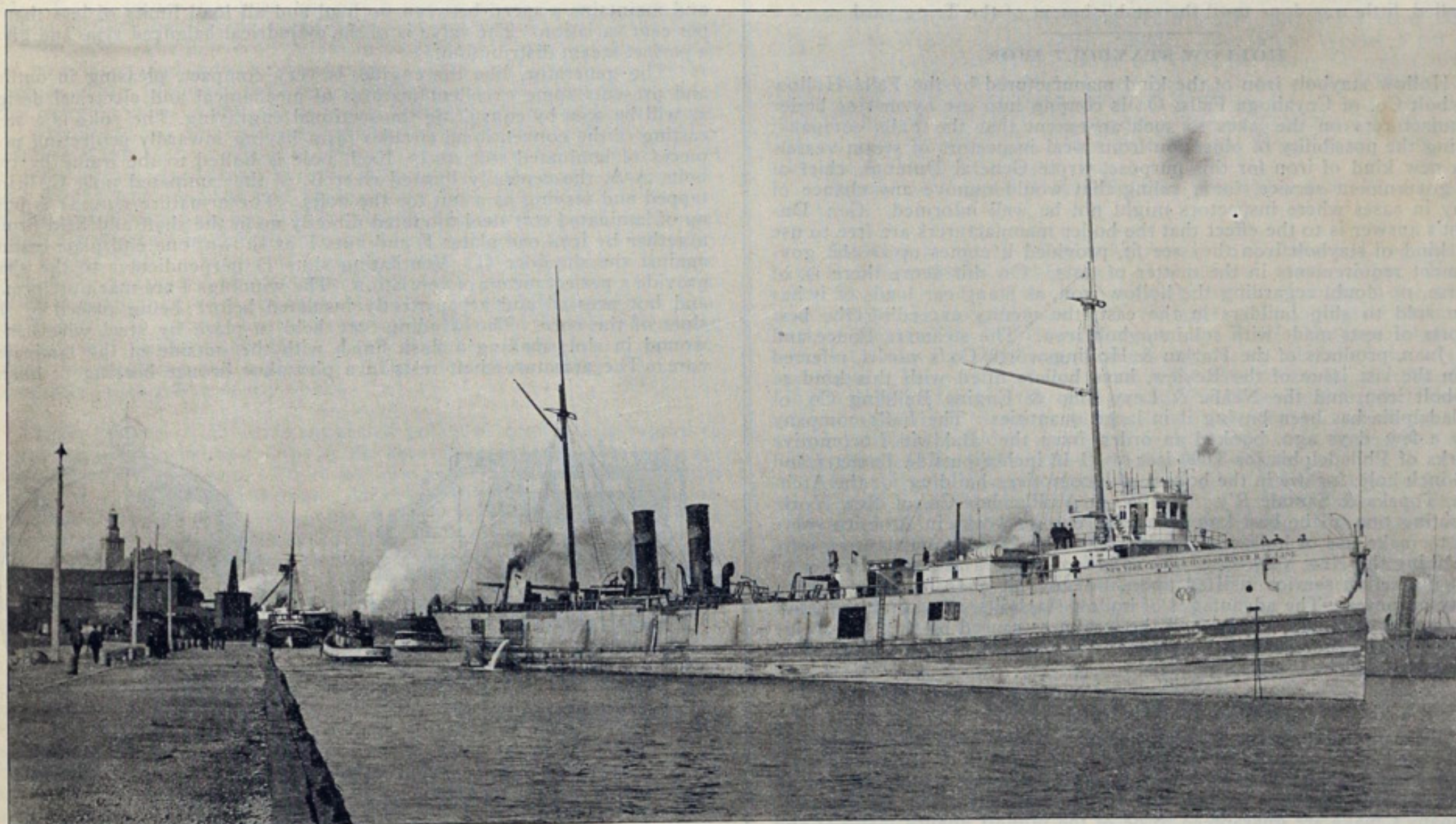
WRECKED STEAMER HARLEM.

A couple of views of the wrecked steamer *Harlem*, the large one showing the vessel as she passed down through the St. Mary's Falls canal from Lake Superior, a short time ago, are presented herewith. It will be noted



that the *Harlem*, although stranded on Isle Royale, north shore of Lake Superior for nearly a year, and subjected to the severe winter weather and gales of the farthestmost part of the upper lake region, is still a valuable piece of vessel property, especially in view of the rise in values that has taken place within the past few months. The Thompson brothers of Port Huron, or the Thompson Towing & Wrecking Co., are to be congratulated upon their success in floating the ship. They spent an entire summer on the job and had quite a large wrecking expedition at work all the time, including some twelve steam pumps, but as they are engaged in wrecking business, the expense to them is not what it would have been if they were called upon to hire others to release the vessel. When they bought the wreck from the underwriters it was said they paid \$30,000 for it, and it is now said that repairs, on account

of the badly damaged condition of the ship's bottom, will cost \$100,000. The job of repairs will undoubtedly be the largest ever undertaken on the great lakes. The figures above quoted are not of a definite kind, and may



STEEL STEAMER HARLEM, WHICH WAS ASHORE FOR NEARLY A YEAR ON THE NORTH SHORE OF LAKE SUPERIOR.

As she appeared at Sault Ste. Marie, bound for Port Huron to be docked.

will be fitted with two sets of vertical triple expansion engines, with cylinders of 31½, 51½ and 84 inches diameter by 51 inches stroke. With 108 revolutions the designed aggregate I. H. P. is 15,000 and the speed expected is 18 knots. She will be fitted with twenty Belleville boilers. The battery consists of four 12-inch, twelve 6-inch, eighteen 12-pounders, six 3-pounders, eight Maxims and four submerged torpedo tubes. Her complement is 773 men, all told.

There are only two steam yachts in this country that are faster than Col. Oliver H. Payne's new steam yacht *Aphrodite*, recently built by the Bath Iron Works. They are the new *Corsair* and *Kanawha*, both 20-knot boats. The *Aphrodite* was designed for 15 knots, yet she has steamed with the two above mentioned 20-knot boats, and it took them, on one occasion in the run home from the races at New York, 42 minutes actual timing to crawl from the *Aphrodite's* taffrail to her stem head. In a seaway the *Aphrodite* could leave behind her any steam yacht afloat. She has tremendous boiler power, and on her first trip across the Atlantic she averaged 14.5 knots for 3,200 miles easy steaming. The vessel is not fitted with forced draft, yet she has covered a measured distance in Long Island sound at a speed of 18 knots per hour. Capt. C. W. Scott is her commander.

The Dominion Iron & Steel Co., which is erecting an extensive plant at Cape Breton, N. S., is to have a rival in the Nova Scotia Steel Co. The newly organized company has large coal deposits at Cape Breton with mines in operation at North Sidney.

Capt. J. G. Warren, United States engineer at Milwaukee, Wis., will open bids Dec. 14 for building a crib breakwater at Sheboygan, Wis.

be wide of the mark, but however this may be, it is certain that the Thompsons have been rewarded for their labors and for the chance they took in buying the wreck. They have a vessel that would undoubtedly sell now for more than \$200,000 if restored to her condition before the accident. The question of repairs has not as yet been settled, as there is some talk of lengthening the ship or selling her in her present condition.

The *Harlem* is a steel steamer of 2,299 tons gross and 1858 tons net. She was built for the Western Transit Co. (lake line of the New York Central R'y) in 1888 by the Detroit Dry Dock Co. and is one of the strongest steel vessels ever turned out of a lake yard. The *Review* is indebted to Capt. Wash. Harrow, who was in charge of the wrecking expedition, for the photographs from which the engravings were made.

PNEUMATIC TOOLS FOR THE CRAMP WORKS.

It is announced that the William Cramp & Sons Co. of Philadelphia, will in the near future make very extensive additions to their equipment of pneumatic tools. This decision is one result of the recent strike in the ship yard. The new equipment will be distributed through all parts of the works. Contracts for riveters, hammers, drills and other tools already placed with the Chicago Pneumatic Tool Co. aggregate more than \$50,000, and it is claimed that ultimately more than \$100,000 will be expended on this score.

Capt. Frederick Watkins, late commander of the American liner *Paris*, whose term of suspension on account of the accident to that vessel was recently cut down by the United States steamboat inspectors from two years to six months, sailed for Liverpool recently. He announced previous to his departure that he would take out another vessel, as he did not wish his career to end with his suspension.

SHIP BUILDING IN RICHMOND.

Comment regarding the recent launching of the torpedo boat Shurbrick at the works of the William R. Trigg Co., Richmond, Va., has left the impression in some quarters that the vessel in question was the first naval vessel constructed at the Virginia capital. This belief is strikingly at variance with the facts in the case. The initial vessel was the gunboat James K. Polk, which was launched in 1845. The Polk was a side-wheeler and carried several guns of what was considered good calibre in those days. A number of war vessels were built in Richmond by the Confederate government. The celebrated Merrimac, or the Virginia as she was rechristened, was built at Norfolk, but her armor and the greater part of her machinery were made at the Tredegar Iron Works in Richmond. Another Richmond-built craft of the days of the civil war was the torpedo boat Squib, and she proved the most successful of all the vessels of this character with the single exception of the David, which sank the Federal warship Housatonic. Although well known it is worthy of note that the machinery of the battleship Texas was built at the Richmond Locomotive & Machine Works.

Numerous merchant vessels have been built at Richmond. Probably the first was the John A. Lancaster, a two-masted schooner built in 1837 by David Currie for the South American trade. At the same yard and in the same year Haskins & Libby built the two-masted schooner Joseph Eames. In 1839 David Currie built at Richmond the Creole, a full-rigged brig which was in the slave trade between Richmond and New Orleans. Probably the first vessel built at Richmond after the war was the iron steamer Richmond, which was constructed in 1873 and is still operated by the Old Dominion Steamship Co. between Richmond and New York. After the Richmond left for Wilmington, Del., where her machinery was installed, little was done until the establishment of the Trigg yard.

HOLLOW STAYBOLT IRON.

Hollow staybolt iron of the kind manufactured by the Falls Hollow Staybolt Co. of Cuyahoga Falls, O., is coming into use by marine boiler manufacturers on the lakes to such an extent that the Falls company, fearing the possibility of objection from local inspectors of steam vessels to a new kind of iron for this purpose, wrote General Dumont, chief of the government service, for a ruling that would remove any chance of delay in cases where inspectors might not be well informed. Gen. Dumont's answer is to the effect that the boiler manufacturers are free to use any kind of staybolt iron they see fit, provided it comes up to the government requirements in the matter of tests. On this score there is, of course, no doubt regarding the hollow iron, as many car loads of it has been sold to ship builders in the east, the quality exceeding the best reports of tests made with solid staybolt iron. The steamers Ponce and San Juan, products of the Harlan & Hollingsworth Co.'s works, referred to in the last issue of the Review, have boilers fitted with this kind of staybolt iron, and the Neafie & Levy Ship & Engine Building Co. of Philadelphia has been buying it in large quantities. The Falls company only a few days ago booked an order from the Baldwin Locomotive Works of Philadelphia for 3,000 feet of 11-16 inches outside diameter and 5-16-inch hole, for use in the boilers of locomotives building for the Atchison, Topeka & Santa Fe R'y. The W. & A. Fletcher Co. of New York, operating one of the best known marine engine works in America, were first to make use of hollow staybolt iron. The Ohio manufacturers were furnishing the New York firm with solid iron when a ruling of the steamboat inspection service insisted upon the staybolt ends being drilled for safety purposes. The advantages of hollow staybolts, as against the labor involved in drilling the holes and the weakness caused by the holes, were pointed out by the Fletcher company and the hollow iron was soon rolled successfully by the use of a mandril.

STEEL TOWING HAWSERS.

The American Steel & Wire Co., some of whose most extensive works are located at Cleveland, are producing a high grade of galvanized steel hawsers and towing lines in connection with extensive manufacture of all kinds of iron, steel and copper wire ropes and cables. The lines of this company's make are guaranteed to be of the highest quality material and the construction such as is most calculated to give surest satisfaction in points of flexibility and durability, which points the company declare they stand ready to demonstrate to any interested parties.

In this connection it may not be amiss to call attention to the great variety of black and galvanized chains made by the American Steel & Wire Co., including the most approved anchor chains. Ship builders will also be interested in the improved quality and patterns of the round and square boat spikes made by the American Steel & Wire Co. at their Cleveland mills. On any of these points detailed information can be obtained by addressing the American Steel & Wire Co., Chicago or New York, where their offices are located.

NEW AIR COMPRESSOR WORKS.

The New York Air Compressor Co. has been incorporated with a capital of \$100,000. The officers of the company are: President, J. W. Duntley, who is also president of the Chicago Pneumatic Tool Co.; vice-president Alexander Mackay, holding the same position in the Chicago company and also closely connected with the National Bank of the Republic, Chicago; secretary-treasurer, W. P. Pressinger, late manager of the New York office of the Chicago Pneumatic Tool Co. The directors are the above mentioned, J. W. Duntley, Alexander Mackay, W. P. Pressinger; also W. B. Albright, manager of the Sherwin-Williams Paint Co., W. O. Duntley, general sales agent, and Thomas Aldcorn, eastern sales agent of the Chicago Pneumatic Tool Co.; also Austin E. Pressinger, attorney-at-law of New York. The company proposes to erect works at Arlington, N. J., which will employ 300 men. Machinery to cost \$75,000 will be installed.

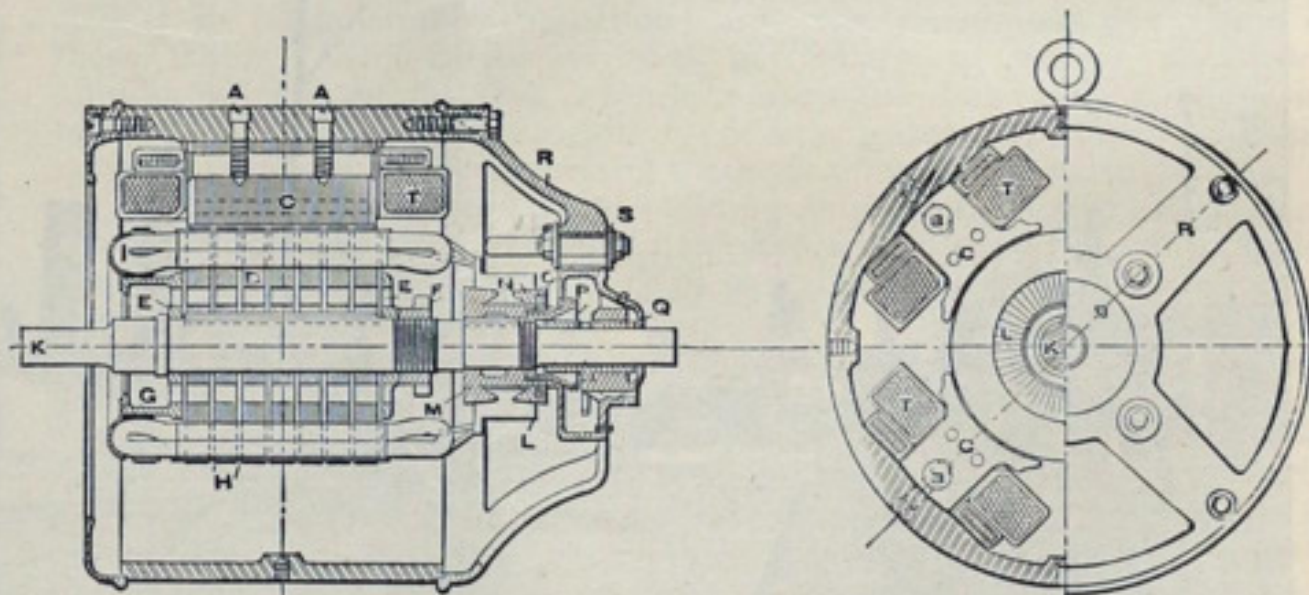
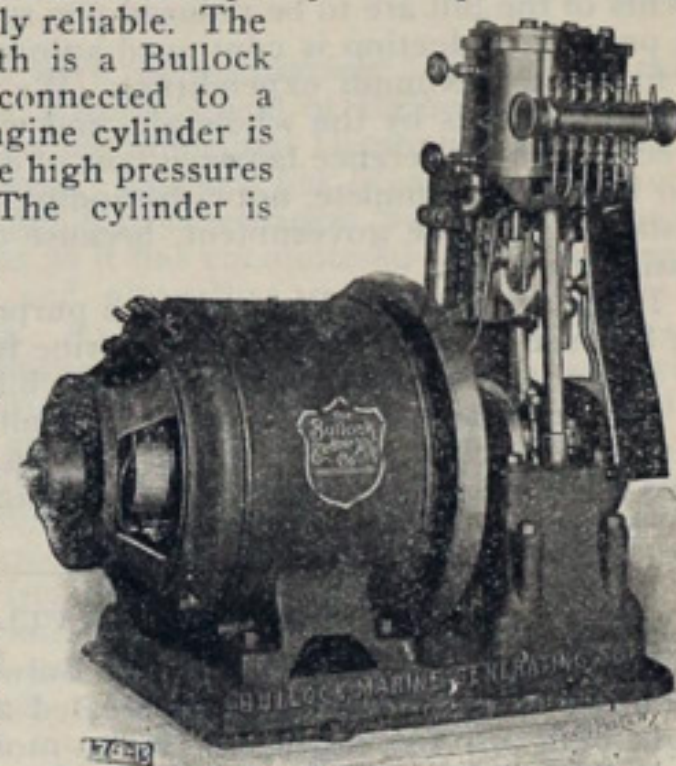
On and after Nov. 6, 1899, the Nickel Plate road will run its dining car on train No. 3 between Buffalo and Bellevue instead of between Conneaut and Fostoria as heretofore.

164, Nov. 30

RECENT DEVELOPMENT IN MARINE GENERATING SETS.

The requirements of marine work are most difficult to fill. Not only is space economized to the last degree but into this curtailed space must be built a machine which will have unusual capacity when speed and weight are considered, and be thoroughly reliable. The combination illustrated herewith is a Bullock type "N-I" generator direct connected to a Forbes marine engine. The engine cylinder is 5 by 5 inches and is made for the high pressures of modern marine practice. The cylinder is supported upon three hollow steel legs, which are rigidly fastened to a subbase common to both engine and generator. To two of these supports the cross-head guide is securely bolted. Means are provided to adjust for wear of the cross-head shoe and guide and in the main bearings. A perfect system of sight feed lubricators is installed upon the side of the cylinder with copper tubes leading to all of the wearing surfaces of the engine. A small balance wheel is provided and assists in the regulation of the engine speed. The governor, which is installed on the outer end of the shaft, is of the inertia-centrifugal type and maintains a speed between no load and all load limits of less than 2 per cent variation. The valve is of the cylindrical balanced type and gives a perfect steam distribution.

The generator, like the engine, is very compact, pleasing in outline and presents some excellent features of mechanical and electrical design as will be seen by consulting the sectional engraving. The yoke is a steel casting of the conventional circular form having inwardly projecting pole pieces of laminated soft steel. Each pole is bolted to the frame by two bolts A-A, the centrally located rivet B, of the laminated pole C, being tapped and serving as a nut for the bolts. The armature core D is built up of laminated soft steel mounted directly upon the shaft and held firmly together by iron end plates E and nuts F as shown, one end plate resting against the shoulder G. Ventilating slots H perpendicular to the shaft provide a perfect means of ventilation. The windings I are machine formed and hot pressed and are perfectly insulated before being placed in the slots of the core. The windings are held in place by steel wire bands wound in slots making a flush finish with the outside of the laminated core. The armature shaft rests in a phosphor bronze bearing of liberal



SECTIONAL VIEW

BULLOCK TYPE "N-I" GENERATOR

190-12

dimensions at the outer end and is key-seated in the hub of the engine fly wheel, which is of extra width and provided for receiving the end K. The commutator bars, shown at L, are held together by the sleeve M, ring N and nut O. The oil shield P prevents oil from finding its way from the bearing Q into the armature. The bearing Q is of self-oiling type, as shown. The end housing R, securely bolted to the frame, carries the brush studs S. The field coils T are machine wound and thoroughly insulated, and are slipped over the poles before the latter are bolted in position.

The engine operates at 600 revolutions per minute and at this speed the capacity of the generator is 5 K. W. at 115 volts pressure. This particular set is now installed upon the steamer Aberdeen, a vessel recently built for the Pacific coast trade.

The manufacturers, the Bullock Electric Mfg. Co., Cincinnati, O., will be pleased to send bulletin No. 5034 showing other engine type generators, to those requesting it.

Names have been selected for all three of the new Rockefeller steamers that are to go into commission on the great lakes next spring. It was decided some time ago to give the names Gen. Orlando M. Poe and Robert W. E. Bunsen to two of these vessels. Now it is announced that the third vessel will be named Chas. R. Van Hise, in honor of the professor of geology and mineralogy at the University of Wisconsin, who had much to do with the discovery and development of the iron mines of the Lake Superior region.

A new machine shop, which will be built by the Berlin Iron Bridge Co. of East Berlin, Conn., for the Wm. Cramp & Sons Co. of Philadelphia, will be 142 feet in width, 350 feet in length and three stories in height. All the floors, including the gallery floors, will be equipped with electric traveling cranes. The building will be of steel framework and the outside walls of brick, the structure being one of the largest and most complete shops in the world.

EIGHTEEN NEW SHIPS OF WAR.

THREE BIG ARMORED CRUISERS, THREE OLYMPIAS AND TWELVE GUNBOATS IS THE LATEST NAVAL PROGRAMME—GENERAL REDUCTION OF WORK IN THE NAVY YARDS—ASSISTANT SECRETARY ALLEN'S REPORT—OTHER MATTERS.

WASHINGTON BUREAU, MARINE REVIEW, 1345 PENNSYLVANIA AVENUE, WASHINGTON, D. C., NOVEMBER 15, 1899.

The project for further naval increase which congress will be asked to authorize at the next session, for immediate construction, involves eighteen warships, three of them armored cruisers of the Brooklyn type but double the size and formidableness; three Olympias, one-third larger and proportionately more powerful; and twelve gunboats of a type recommended by Admiral Dewey as essential for the effective patrol of the Philippine archipelago. This is the program now under consideration by the naval board of construction, which was directed by Secretary Long several weeks ago to study the needs of the navy and to submit recommendations for required additions to the fleet. At the meeting of the board held this week the members were disposed to divide the twelve gunboats equally into two classes, one of 1,000 tons (about the displacement of the Wheeling and the Marietta) and the other of 800 tons, which will make them smaller than any of the steel vessels in the navy, although larger than the Gloucester and other converted yachts. For both these classes of gunboats maximum draft of 8 feet is regarded as imperative, which is nearly 4 feet less than that of the Helena and the Wilmington, vessels designed particularly for river service, and which up to this time are the lightest draught ships in the service.

The proposed improved Olympias represent a type that was recommended to congress last year, but which was crowded out by the authorization of three battleships, three large armored cruisers and six cruisers of 2,500 tons. The new cruisers are to be 8,000 tons each and are to have the bow turret and battery arrangement which has proved so advantageous in the Olympia, the extra 2,000 tons being devoted to increased coal carrying capacity and engine space, radius of action and heavier guns.

The board has shown some hesitancy about recommending a further increase of armored vessels at the present time, as six higher powered and larger armored vessels than have yet been built for the navy were authorized by the last congress and have not yet been designed; and because 20,000 tons of armor are required for vessels already authorized, an amount which can scarcely be delivered in less than four years after its manufacture begins. The necessity of more first-class armored cruisers is, however, fully recognized and the board this week favored three of about 13,000 tons displacement of a type involving no marked departures from the Brooklyn in arrangements, though of double that vessel's power and tonnage and defensive qualities. Every member of the board was emphatic for sheathing and coppering all these vessels to render them comparatively independent of dry docks.

Rear Admiral Hichborn's suggested policy of economy in regard to repairing and overhauling ships at the several navy yards has been approved by the department. There are now nearly fifty vessels undergoing repairs or waiting for renovation. An order will soon be issued to commandants, in which the vessels most urgently required for service will be designated, with instructions to continue the repairs until they are ready and to abandon those ships not needed now for active service. This policy has become necessary in order that the construction and engineering bureaus may be able to get through the next four months with the funds at their disposal.

The reduction in work begins at the Portsmouth navy yard and extends to all but the New York where the vessels are of such a class that practically all are now required for some station. The two Spanish gunboats, Alvarado and Sandoval, are so nearly completed at Portsmouth that the department will direct that the work continue on them until they are ready for sea. At the same station is the Raleigh, on which \$500,000 is to be expended before she is again in commission. No special appropriation has been made either for this vessel or the Cincinnati, which is to undergo similar changes at Norfolk, so that it is intended to perform only so much work on these vessels as to prevent their deterioration.

At the Boston navy yard the reduction in work affects three ships. The Vicksburg is required for duty in the Philippines and is to be pushed rapidly and got out of the way. The vessel should be ready for sea in thirty days. Upon the amount of work and the cost required on the Olympia will depend how rapid the progress will be at first. A survey board is now examining the ship and will report its findings in a few days. There is no purpose in any event to allow the Olympia to remain at the yard without some repairs being begun, and while the force at work on the cruiser may be small at first it will be increased as the money becomes available. All work is to stop on the cruiser Topeka and the colliers Sterling and Peoria. Neither of the latter is required for service and both can be left for the present in the hands of ship keepers.

At the League Island navy yard it is recommended, and will be so ordered, that the work on the Minneapolis, the Columbia and the Miantonomoh proceed only as the allowance of money under the bureaus will permit. It has been found necessary also to abandon work on the Panther, as it is not thought the ship is immediately wanted for service. The Dixie requires an expenditure of \$60,000 to get ready for sea, and it is recommended that work on the vessel proceed very slowly.

At the Norfolk yard there are a large number of ships under repair and on which work has been progressing favorably. The order will no doubt stop work on a number, or at least curtail operations considerably. It is now intended to continue repairs on the Fortune and on the San Francisco also. Work on the Apache, Dorothea, Frolic, Hannibal, Hawk and others will proceed only as it may be necessary to prevent deterioration. The San Francisco will probably not be ready for sea under one year and the Cincinnati, which is to undergo extensive changes, will probably not be in commission for eighteen months. Fully \$500,000 is necessary to carry out the work on this ship.

At the Mare island navy yard the Boston has been waiting months for an overhauling. This ship has been for two years in Asiatic waters and

is now in many respects obsolete. Changes that will modernize the cruiser have been ordered and will be carried out. The Mohican and the Alert at the same yard and the torpedo boats are not required in the service, so no further work will be done on them.

Rear Admiral Hichborn's statement, showing to Nov. 1 how far work has progressed upon various vessels for the navy now in course of construction, is as follows:

Battleships—Kearsarge, Newport News, 97 per cent; Kentucky, Newport News, 95 per cent; Illinois, Newport News, 71 per cent; Alabama, Cramp & Sons, 91 per cent; Wisconsin, Union Iron Works, 79 per cent; Maine, Cramp & Sons, 15 per cent; Missouri, Newport News, 1 per cent, and the Ohio, Union Iron Works, 7 per cent.

Sheathed cruisers—Albany, Armstrong's, England, 94 per cent.

Monitors—Arkansas, Newport News, 4 per cent; Connecticut, Bath Iron Works, 30 per cent; Florida, Lewis Nixon, 17 per cent; Wyoming, Union Iron Works, 24 per cent.

Torpedo boat destroyers—Bainbridge, Neafie & Levy, 30 per cent; Chauncey, Neafie & Levy, 28 per cent; Dale, William R. Trigg Co., 45 per cent; Decatur, William R. Trigg Co., 44 per cent; Hopkins, Harlan & Hollingsworth, 27 per cent; Hull, Harlan & Hollingsworth, 27 per cent; Lawrence, Fore River Engine Co., 27 per cent; MacDonough, Fore River Engine Co., 60 per cent; Paul Jones, Union Iron Works, 50 per cent; Perry, Union Iron Works, 50 per cent; Preble, Union Iron Works, 50 per cent; Stewart, Gas Engine & Power Co., 8 per cent; Truxtun, Maryland Steel Co., 5 per cent; Whipple, Maryland Steel Co., 5 per cent; Worden, Maryland Steel Co., 5 per cent.

Torpedo boats—Dahlgren, Bath Iron Works, 98 per cent; T. A. M. Craven, Bath Iron Works, 98 per cent; Stringham, Harlan & Hollingsworth, 85 per cent; Goldsborough, Wolff & Zwicker, 93 per cent; Bagley, Bath Iron Works, 3 per cent; Biddle, Bath Iron Works, 3 per cent; Blakely, George Lawley & Son, 60 per cent; De Long, George Lawley & Son, 60 per cent; Nicholson, Lewis Nixon, 42 per cent; O'Brien, Lewis Nixon, 42 per cent; Shubrick, William R. Trigg Co., 65 per cent; Stockton, William R. Trigg Co., 65 per cent; Thornton, William R. Trigg Co., 64 per cent; Tingey, Columbian Iron Works, 38 per cent; Wilkes, Gas Engine & Power Co., 20 per cent.

Submarine torpedo boats—Plunger, Columbian Iron Works, 85 per cent.

Assistant Secretary Allen in his report to Secretary Long indorses and recommends the establishment of a national naval militia. He says that the experiences of the year suggests certain changes in the plan as outlined by the congressional bill. He urges the adoption of the amendments prepared by Lieutenant Commander W. H. H. Southerland who was for some time in charge of the naval militia bureau of the navy department. The personnel act has made the term of service of enlisted men in the navy four years; the same period should be fixed for enrollment in the naval reserve. Some provision should be made by which the naval reserve officer should be promoted in war time with the regular officer with whom he holds the same date of commission.

It is also recommended that steps be taken for the organization of a permanent coast signal system for the retired list of the navy and the employes of the light-house and life saving service. There are several thousand of these men, and with a small appropriation and an annual drill for a few days each year they would be competent to take up duties immediately upon the outbreak of the war. With a retired naval officer in charge of each light-house district and an officer in charge at the navy department, and the necessary paraphernalia at the nearest navy yard ready for use, this necessary adjunct of war could be put in working order in twenty-four hours. The department undertook to afford the naval militia of the country an opportunity to drill at sea under service conditions and the offer was accepted by the governors of all but one of the states having militia organizations.

Capt. C. M. Chester, who is to command the new battleship Kentucky, has sent to the navy department a brief report upon the performance of that vessel recently in a heavy sea off the Virginia coast while out on a builders' trial spin. The vessel behaved admirably in the big rollers. On reaching the mouth of the Chesapeake it was found that heavy weather was prevailing, but the ship was pointed out to sea and ran direct to the east for eight miles beyond Cape Henry light, where it was deemed inadvisable to proceed further on account of trouble in making out the landmarks. The Kentucky was run back and forth over this course at a speed of 13 to 14 knots, turning in the rough sea with marked facility and slight motion. The battleship pitched easily with a maximum dip of but 3 degrees, and rolled in turning in the trough of the sea generally with only 8 or 9 degrees heel, and once to a maximum of 16 degrees. While forced draft was used to a pressure of $\frac{3}{4}$ -inch for the space of half an hour, the conditions did not afford an opportunity for a speed trial, but it was estimated from a patent log that the Kentucky made about 15 knots on about 103 revolutions of the engine. For a short time they worked up to 106. In general the results were very satisfactory.

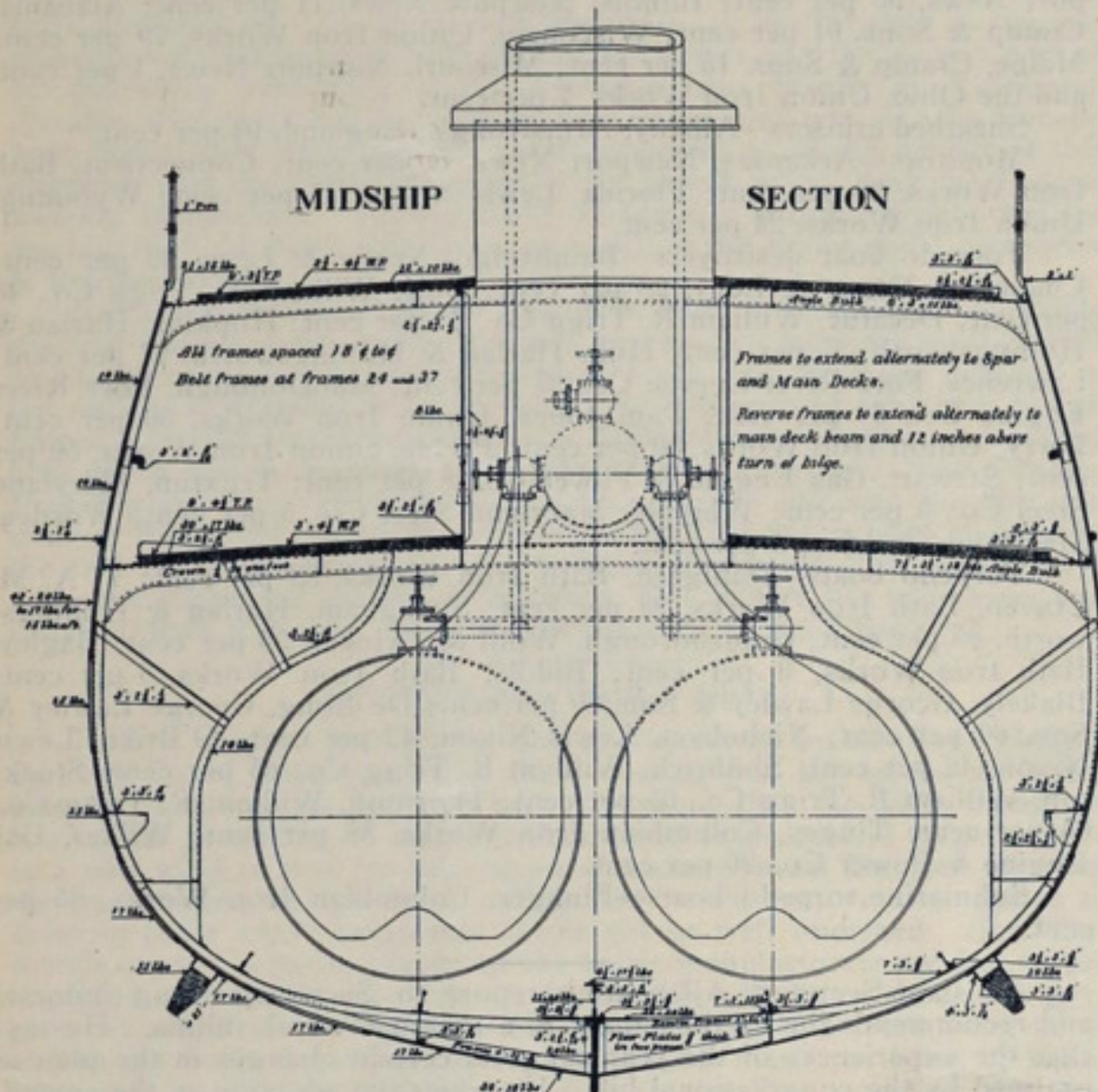
The cruiser Atlanta, which is expected to be put in commission next week, will be the first vessel to be equipped with the metal furniture designed for vessels of the navy. The innovation is the result of experience in recent naval engagements and is another step in the direction of doing away with the liability of fire on shipboard during an engagement by the removal of as much of the woodwork as possible. Considerable interest attaches to the result of this experiment on the Atlanta.

It is expected that the cruiser Albany, which is now nearing completion at the ship yard of the Armstrong's, in England, will be turned over to the United States authorities in January. Numerous changes have been made in the cruiser to correct defects found in her sister ship, the New Orleans. It was at first proposed to send the Albany to the Philippines direct, but it has now been deemed advisable to bring her to New York, in order to fit her out for naval service.

NEW STEEL LIGHT-SHIP.

PLANS FOR ANOTHER FIRST-CLASS VESSEL TO BE CONSTRUCTED FOR THE UNITED STATES LIGHT-HOUSE SERVICE—A CRAFT IN EVERY WAY EQUAL TO THE BEST OF HER KIND.

A steam light-vessel, for the construction of which the United States light-house board has just advertised for bids, will be of steel 112 feet in length between perpendiculars, 28½ feet molded beam and 14 feet 10



MIDSHIP SECTION OF THE NEW LIGHT-SHIP.

inches depth of hold from top of keel to top of main deck beam amidship. The vessel will have three decks, main and spar decks being continuous and the lower deck extending from the stem to the coal bunker

by steam. All workmanship is to be fully up to the requirements of the American Shipmasters' Association.

The vessel will be fitted with one vertical, inverted, direct-acting, open-front, surface-condensing, fore-and-aft compound engine with cylinders of 15 and 30 inches diameter and a common stroke of 22 inches, driving one right-hand four-bladed cast iron propeller of the solid type, about 7 feet 6 inches in diameter and of suitable pitch of screw. Steam will be supplied from two boilers of the gunboat type, designed for a working pressure of 100 pounds per square inch, with a mean diameter of 9 feet, and 16 feet 4 inches length. The crank shaft will be forged in one piece and made of the best quality of steel, 7 inches in diameter. Each boiler will be supplied with two Fox corrugated furnaces, fitted so that they may be removed, with a diameter inside the corrugations of 40 inches.

The equipment of the vessel will be modern in every respect. The steering gear will be of the Robinson make or equally good, and there will be a steam windlass. There will be fitted twenty-two water tanks of an aggregate capacity of about 18,000 gallons. Six tanks will be stowed in the after hold, twelve tanks in the forward hold and four on the lower deck, forward.

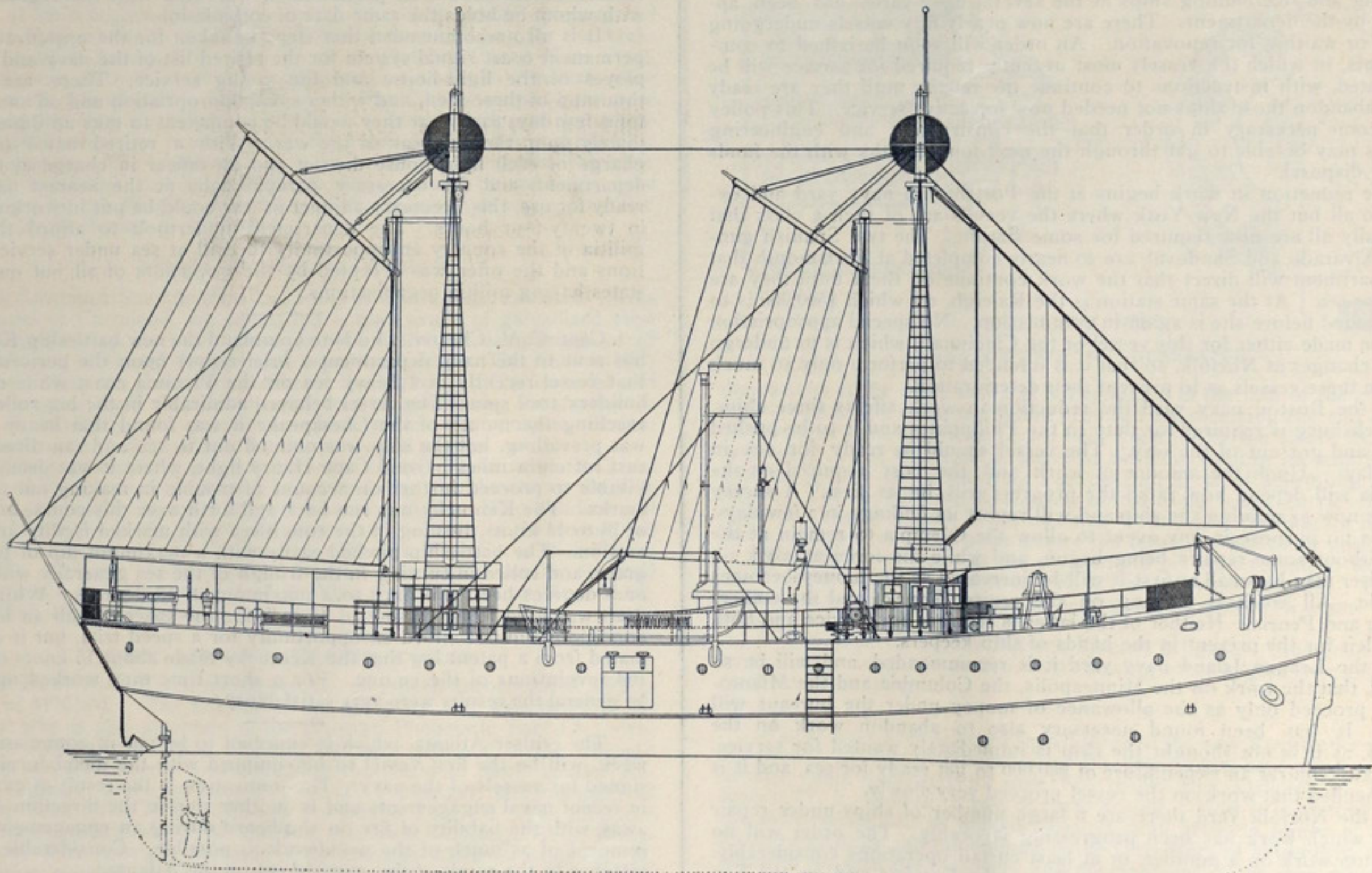
A Crosby chime whistle and a Crosby automatic clockwork will be installed and the vessel will be heated throughout by steam. In addition to the necessary trials of the machinery at the dock, the specifications stipulate that there shall be held a trial trip of twelve hours duration, during which the engine must develop 400 indicated horse power with a steam pressure of 100 pounds per square inch.

SYSTEM IN ADVERTISING.

Mr. B. Harding, who is connected with the publishing department of the Westinghouse companies, Pittsburg, was in Cleveland a few days ago. An idea of the magnitude of Westinghouse interests may be gained from the statement that some fifteen or twenty men are constantly employed in the department to which Mr. Harding belongs. None of them are printers and none engaged in mechanical work of a publishing kind. Their work is the preparation of catalogues, pamphlets, articles for the technical press, etc., and the force is growing all the time. Mr. Harding talks very interestingly of this feature of Westinghouse enterprise and of the great future of electricity, especially as applied to manufacturing plants. His mission to Cleveland was to write of a great outfit of electrical machinery recently installed at the works of Cleveland Twist Drill Co. "I am not an engineer," he said, in answer to a question, "and that was one of the reasons why I was hired for this work. I was engaged on the principle that the man without a knowledge of electricity but who possessed other necessary qualifications, could soon learn enough of the business to write for the general public more interestingly than the elec-

trical engineer."

Reports from Washington concerning the bids for the construction of the six new cruisers are to the effect that the bureau chiefs think more



OUTBOARD PLAN OF THE NEW STEEL LIGHT-SHIP TO BE BUILT FOR THE UNITED STATES LIGHT HOUSE BOARD.

bulkhead and from the sternpost to the engine bulkhead. Steel bulkheads will divide the hull into five watertight compartments. Accommodations for the crew will be forward on the main deck. There will be five staterooms with two beds in each room, pantry, galley, lockers, wash-room, water closets, etc., with mess room amidships, between the state-rooms. There will be two hollow steel masts and a fog signal operated

favorably of the Wm. R. Trigg company's design for a 19-knot cruiser than of any of the other builders' designs. It is probable, however, that all the contracts will be awarded on the navy department's designs, as the department has given the design of these vessels great attention, and if a gain is made in speed the increased weight of machinery necessitates lessening or eliminating other advantageous features.

HOLLAND BOAT AND HER TESTS.

PURCHASE OF THE VESSEL SAID TO BE RECOMMENDED BY INSPECTION BOARD OF THE NAVY DEPARTMENT—SUCCESS OF RECENT TRIALS.

As fuller details become available regarding the trials of the submarine torpedo boat Holland, referred to in the Review last week, it would seem that there is cause for the claim that a very favorable report will be made to the government. The report of the special inspection board has not been made public, but it is understood to contain a recommendation that the navy department seek authority from congress for the purchase of the vessel. Indeed, Mr. Low, who was the personal representative of Secretary Long at the recent trials, is said to have expressed a belief that it would be wise to provide for fifty or more submarine boats to be stationed along the sea coasts, particularly in the vicinity of Boston and New York harbors, the mouth of the Delaware, the Virginia capes and at the Golden Gate. Rear Admiral Rodgers, president of the naval inspection board, upon his return to Washington after the trials, stated that he was much pleased with the improvements made in the Holland since last year. It was at the suggestion of the board of inspection that many of the changes referred to were made.

During the recent tests the Holland was under water for intervals of twenty minutes at a time. To all practical intents and purposes the governmental trial of some days since demonstrated the ability of the Holland

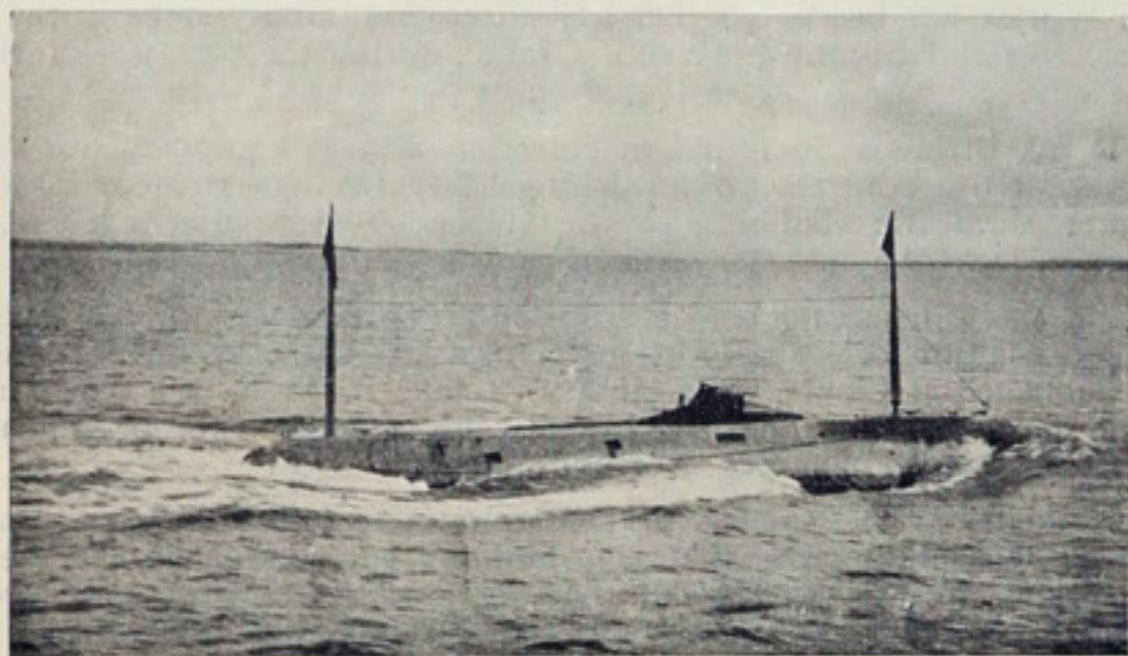


FIG. 1.—HOLLAND BOAT GOING BELOW SURFACE.

to respond to a summons to sink beneath the surface, approach a hostile ship with accuracy, discharge a torpedo, wheel about in her course and return to a place of safety within twenty minutes from the time of first submerging. Referring to the Holland and the trials recently made the Electrical World and Engineer says:

"For some time past, a series of experiments have been carried on with the Holland by the Electric Boat Co. in the Peconic bay, on the north coast of Long island. So much has been said about this interesting craft that the public has become fairly familiar with such details as it is deemed fit to make known, but it may be here recalled that she is about 53 feet by 11 over all, and that fully equipped she weighs out of water about 75 tons. Of this weight, 22½ tons may be credited to the cells of the Electric Storage battery Co., sixty-six special cells having been supplied for the work. The battery is placed in a compartment amidships, and thoroughly insulated. Over the battery stands the conning tower with steering gear and the compressed air flasks, while below it is the water tank. Astern of the battery come in order the air compressor, the gasoline engine driving the generator and the shaft thence to the screws. Immediately above is



FIG. 2.—HOLLAND BOAT PREPARING FOR RUN.

the dynamite torpedo tube. Ahead of the battery are the trimming and oil tanks in the bilge, the Whitehead torpedo in tube, the aerial gun and torpedo and the projectile magazine. The battery will furnish 350-amp. for four hours, giving an ample speed of 8 to 10 miles. On the surface, the gasoline engine runs her at 6 knots an hour, and enough fuel is carried for a 1,500-mile run. The driving mechanism is such that the generator can be driven by the engine to charge the batteries, or can be thrown off the engine and on the batteries, running then as a motor while the boat

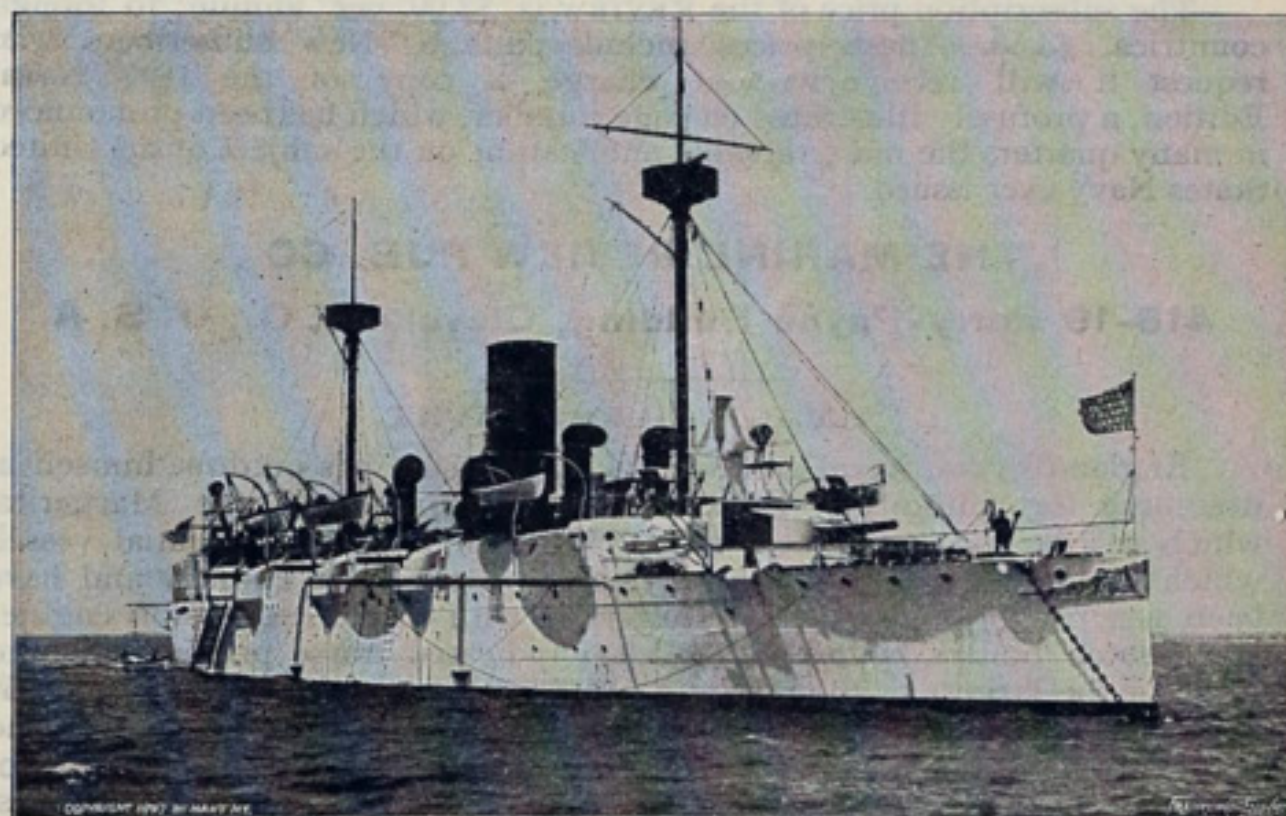
is submerged. This 'motor-generator,' built by the Electro-Dynamic Co. of Philadelphia, which, by the way, has just been absorbed by the Electric Boat Co., is capable of developing 50 horse power at 800 revolutions, or 150 horse power at 1,200 revolutions. The weight is about 4,000 pounds. The machine is shunt wound, and with the aid of a rheostat its voltage as a generator can be varied from 120 to 160. It has two commutators and an armature with double winding. Speed variations are obtained first by combining the two armature windings in series and including in the circuit a considerable resistance; secondly, by the windings in series, and third, by the windings in parallel. There are also a 10 horse power motor for the air compressor, and other small motors for ventilating and pumping, all energized from the battery; and all the electrical apparatus for power and light is interconnected through a small and compact switchboard. While the Holland may not be very roomy, she is probably not less comfortable than the average cup defender or challenger.

"The prolonged trials over the measured course at Peconic bay and in the waters of that vicinity have, it is stated, yielded results beyond those anticipated. It has been ascertained that she can remain twenty-four hours submerged without danger of asphyxiating her crew of six and the torpedoman, and that her radius of action under water at five miles an hour is easily six hours. The most interesting tests have been made at depths of 20 feet, the deepest obtainable in the bay."

WRECKED CRUISER CHARLESTON.

As in the merchant marine, so also in the navy—when a ship goes ashore it is announced in nine cases out of ten that the reef, shoal or whatever the obstruction may be is not on the chart. The dispatches from Manila and from Washington all say that the coral reef near Kamiguin island, north coast of Luzon, on which the United States cruiser Charleston will very probably spend the rest of her days, is not to be found on any of the charts of the Philippines. The facts will not be known until the accident is investigated by a court of inquiry, which will be done at once. It is only fair to say, however, that the loss of the vessel is generally considered quite unavoidable, in view of the exceedingly dangerous character of the coast of Luzon, the lack of necessary aids to navigation and the fact that Philippine waters as a whole are most indifferently charted.

The Charleston is one of the older vessels of the new navy. She is included in the group of vessels following the completion of the cruisers Chicago, Boston, Atlanta and Dolphin, built in 1882 and 1883, which were



UNITED STATES CRUISER CHARLESTON.

the pioneers of the present navy. The Charleston was built by the Union Iron Works at San Francisco, her keel being laid in the year 1887. The contract price of her hull and machinery was \$1,017,500. She was launched in July, 1888, and placed in commission for the first time in December, 1889. The ordnance bureau of the navy has been busy for some time past making extensive alterations in the battery of the Charleston, and had these been completed the ship would have been brought thoroughly up to date.

The naval board of construction still has under consideration the matter of the award of contracts for the cruisers of the Denver class, publication of the bids for which was made in the Review last week. It will be remembered that several of the bidders offered to provide vessels that would exceed the speed stipulated if they were allowed to build in accordance with their own designs. It is not probable that any of these propositions will be accepted, although it is likely that the government requirements will be changed so as to exact a speed of 17 knots instead of 16½ knots as originally contemplated. Contracts will in all probability be given to the Bath Iron Works, Union Iron Works, the William R. Trigg Co., the Fore River Engine Co., and Lewis Nixon. The sixth contract will be placed with Townsend & Downey of New York if it is found upon investigation that they can get a plant ready in six months. Otherwise it will go to the Neafie & Levy Co. of Philadelphia.

A recent change at the Philadelphia ship yard of the Wm. Cramp & Sons Co. is the retirement of William G. Cramp, a cousin of Charles H. Cramp, and who has for a long time past occupied the position of master of the docking of vessels. Mr. Cramp, who is seventy-six years of age, announces that he will spend the remainder of his days in leisure.

The torpedo boat Bailey will be launched at the yard of the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, at Morris Heights, New York City, Dec. 5.

THE MARINE REVIEW IN 1900

tion to every phase of this subject throughout the closing year of the century. It will not only tell just what the people in the industry beyond the seas wish to know, but it will give accurate information regarding the use that is made of American tools in foreign yards, and will present for its readers in the United States the fullest details regarding all that is new in foreign practice.



The subscription price of the REVIEW is \$2.00 per annum; to foreign countries, \$3.50. These prices include postage. New subscribers who request it will receive without charge a copy of the 1899 Naval Edition, a profusely illustrated 60-page number, which has been pronounced in many quarters the most valuable publication on the subject of the United States Navy ever issued.

THE MARINE REVIEW PUB. CO.,
418-19 Perry-Payne Building, Cleveland, O., U. S. A.

A MAGNIFICENT YACHT.

England's great naval architect, G. L. Watson, has outdone himself in designing for Anthony J. Drexel a new pleasure craft, the Margerita, which will be the finest yacht afloat. Drawings of this palatial vessel, which will be launched in February, have reached this country and have been generally admired. The Margerita, with triple expansion engines and Scotch boilers, will develop 5,000 indicated horse power—equal to some of the largest of the Atlantic liners. Her coal capacity will be 550 tons. She will have eight boats, one a steam launch for the crew, and another a liquid fuel launch 35 feet long for the owner. The dimensions of the yacht, which will compare favorably in size with some ocean steamers, are: Length over all, 323 feet; length on load water line, 272 feet; beam, extreme, 36 feet 7 inches; draught of water, 16 feet 6 inches. She is to make 17 knots over an 80-knot course. The crew will number sixty-eight.

Reports from New York relative to the consolidation of several of the largest ship building plants of the country would indicate that the scheme has not as yet extended beyond an effort on the part of promoters to secure options on which definite negotiations might be undertaken. The plants under consideration are those of the William Cramp & Sons Co. of Philadelphia, Newport News Ship Building & Dry Dock Co. of Newport News, Va., Union Iron Works of San Francisco, Bath Iron Works of Bath, Me., and Columbian Iron Works of Baltimore. These are the largest works in America aside from the ship yards of the great lakes which are already consolidated. It is said that the five works represent about \$20,000,000 of invested capital. The banking firm of J. & W. Seligman & Co. of New York, is said to be connected with the negotiations.

The fire board of the city of Buffalo opened bids a few days ago for the construction of a new fireboat. The bids received were as follows: American Ship Building Co., Cleveland, \$115,000; Chicago Ship Building Co., Chicago, \$101,000; Union Dry Dock Co., Buffalo, \$91,000. The contract, which will of course be given to the Buffalo concern, calls for the completion of the boat within six months.

Johnston Bros. of Ferrysburg, Mich., are said to have secured a contract from the Arnold Transportation Co. of Mackinaw, Mich., for the construction of a passenger steamer of 175 feet length. The vessel is to be operated between Mackinaw and Sault Ste. Marie, Mich., and will be speedy.

The captain of the steamer Denver reports to Geo. L. McCurdy, representing insurance-interests, that when about south-east of the outer or second barrel buoy, and about 500 or 600 feet from same his steamer struck some unknown obstruction, probably rocks. This note is printed for the guidance of other masters.

ITEMS OF GENERAL INTEREST.

The first-class sea-going battleship Kearsarge, officially known as No. 5, and built by the Newport News Ship Building & Dry Dock Co., has been officially accepted by the United States government.

The submarine torpedo boat Holland will probably be taken to Washington early in December for the purpose of demonstrating its capabilities before naval committees of the senate and house of representatives.

A traveling crane with a capacity of 2½ tons is being erected at the Roach yard, Chester, Pa., the especial object in view being the handling of material for two large vessels building for service on the Pacific coast.

Mr. George C. Shepard, who has for the past 18 months served as draughtsman at the yard of Wm. Cramp & Sons Co. at Philadelphia, has accepted a position with the Maryland Steel Co. of Sparrow's Point, Md.

The bureau of navigation, treasury department, has been informed that the Norwegian flag law of 1898, which in effect removes the symbol of union between Sweden and Norway from the Norwegian merchant flag, will go into force Dec. 15 next.

According to the regular weekly statement issued from the bureau of navigation, treasury department, the steamer Chester W. Chapin, recently completed at the yard of the Maryland Steel Co., Sparrow's Point, Md., is of 2,868 gross or 1,822 net tons burden.

The United States torpedo boat T. A. M. Craven, built by the Bath Iron Works, has been given her first three preliminary spins in the Kennebec river and Boothbay Harbor, Maine, during the past week. Steaming easily, she has already made 26 knots per hour.

R. W. Birnie & Sons, manufacturers of canvas equipment for vessels, have secured a contract for furnishing sails, awnings and covers for the steamer Maracaibo, building by the Harlan & Hollingsworth Co., Wilmington, Del. About 3,000 yards of canvas will be required.

The navy department is understood to be considering the matter of the construction of a dry dock in connection with the naval station to be established at Cavite, near Manila. Lieut. Hobson, in a recent report to the department, emphasized forcibly the inconvenience of dependence upon the docking facilities at Hong Kong.

Russian naval estimates for 1900 amount to \$48,650,000, as compared with \$46,150,000 for 1899. The ship building vote is \$16,330,000; the guns and electric fittings, \$5,000,000; the wages of the effective staff are \$2,640,000, and of the non-effective nearly \$2,500,000; \$1,775,000 is to be spent on Libau, \$1,675,000 on Vladivostok and \$1,675,000 on Port Arthur.

The fourth American-built steel shipentine Edward Sewall, built by Arthur Sewall & Co. of Bath, Me., from plans prepared by William A. Fairburn, left Bath, Monday afternoon, Nov. 6, in command of Capt. Joseph Sewall, late commander of the ship Susquehanna. The Sewall is a magnificent 3,000-ton ship, designed to carry 5,000 tons on a draught of only 22 feet.

The Bethlehem Steel Co. of South Bethlehem, Pa., reports many acceptances of the offer which they recently made to furnish nickel steel locomotive forgings at a reduced price, the only qualification of the offer being that they should be returned with a complete record of their performance at the conclusion of their terms of service. The results of this novel experiment will be eagerly awaited by persons interested.

P. A. B. Widener's steam yacht Josephine, which was turned over to her owner by the Neafie & Levy Co. of Philadelphia some time ago, was given an official trial run a few days ago, in order to verify her guaranteed speed of 17 knots. In a run of 4 hours and 26 minutes, she made under good conditions, the vessel averaged 17.57 knots. She carried 200 pounds of steam and her engines averaged 161 revolutions per minute.

Judge Lacombe of the United States circuit court, New York, has decided that the government must furnish a bill of particulars in the suit brought against Thomas and Austin Walsh, John D. Crimmins and Ralph J. Packard to recover \$171,360.76. The bill of particulars must specify wherein the work done for the government was faulty. The Walshes completed the construction of the timber dry dock at the Brooklyn navy yard, which was left unfinished by John Cillins, the original contractor. Crimmins & Packard were the Walshes' sureties. The government charges that the work done was not what it was represented to be.

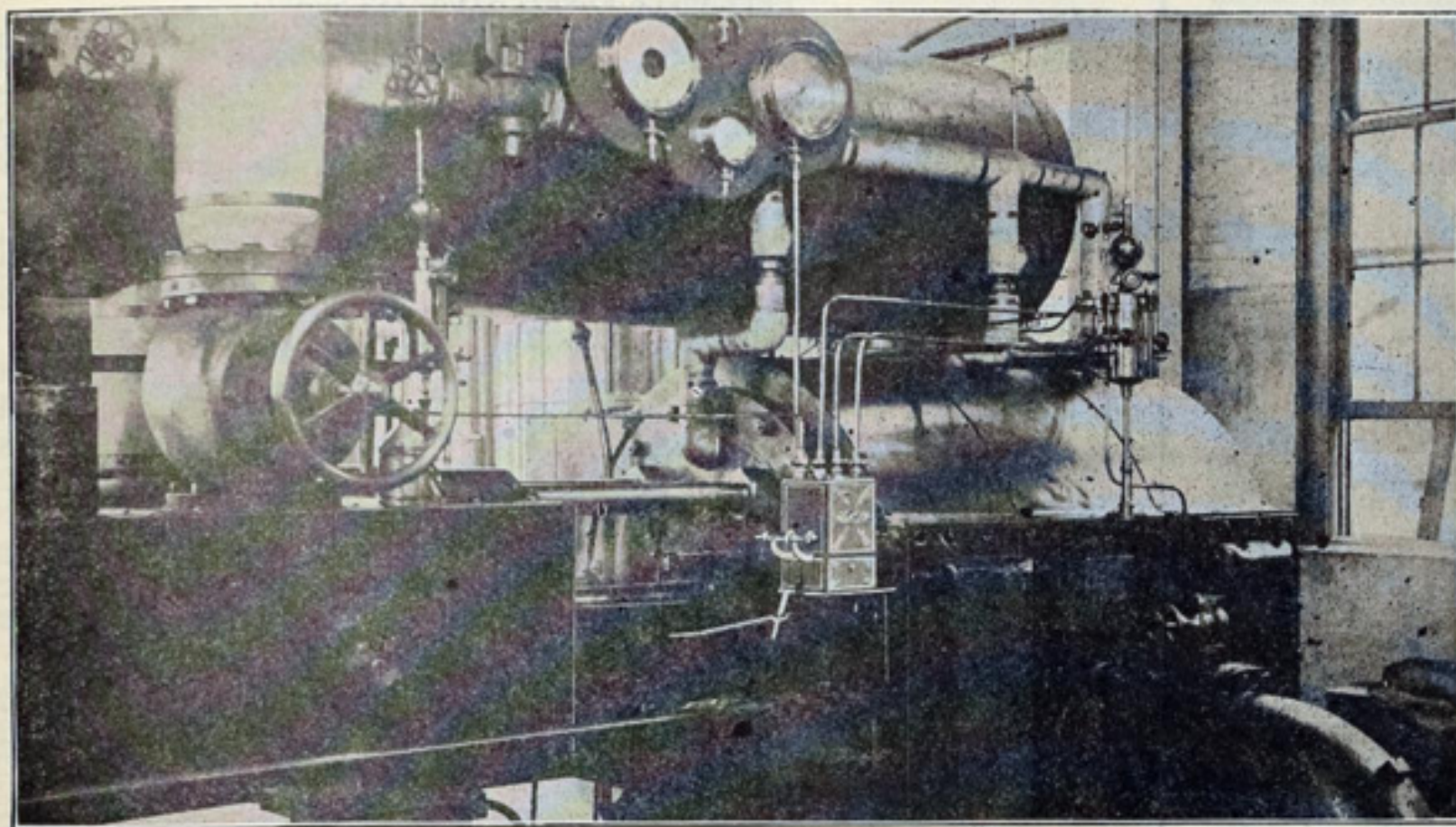
Commander A. B. H. Lillie, U. S. N., has been assigned to duty on the United States collier Marcellus, which has been fitted by the Lidgerwood Co. of New York with apparatus for coaling vessels at sea. The collier will go to sea in a few days with a crew made up of sailors from the battleship Indiana. The coaling device consists of a single cable running around two drums, one on the collier and one on the vessel that is to receive the coal. Basket cars containing coal are sent from ship to ship, the cable by automatic action remaining taut. The test will be made on the battleship Massachusetts which will accompany the Marcellus outside Sandy Hook.

The new Kaiser dry dock at Bremerhaven is the first German dry dock built entirely of stone and is not only the largest dry dock in Germany, but one of the largest in the world. It is 722 feet in length, 90½ feet breadth and 31 feet depth. The closing of this dock is accomplished by means of a lifting pontoon, which can be removed from the outer end of the dock to a point some distance inside when it is desired to dock a small vessel. The dock can be emptied in from 2 to 2½ hours. On either side of the dock are two cranes of 50 tons capacity and at the southeast corner is a crane with a lifting capacity of 150 tons. The North German Lloyd Co. has taken the dock on a lease for twenty-five years, with the understanding that the German navy is also to have the use of it.

The Nickel Plate road offers one and one-third fare for the round trip Nov. 29 and 30, good returning until Dec. 1, inclusive, account Thanksgiving day. Tickets available within a radius of 150 miles. Inquire agents.

PHENIX METALLIC PACKING.

The continued use of high steam pressures has made a good metallic packing a necessity on all high pressure rods. Many have objected to the comparatively high first cost over that of the ordinary packings, but the shrewder steam users have long ago come to the conclusion that comparing the cost of buying soft packings during the life of a good metallic packing, the latter is considerably cheaper, to say nothing of the expense of stopping machinery to repack worn boxes. The Phenix metallic packing, illustrated herewith, has found favor in the eyes of the Standard Oil Co., Chicago Ship Building Co., Newport News Ship Building & Dry



Dock Co., Oliver Iron Mining Co., and numerous railroads and city power and pumping stations. It consists of a number of suitably formed rings of anti-friction metal, all of which are quartered, and hence can be placed in the stuffing boxes easily and quickly without disconnecting the rods, while the shape of the rings and the elastic backing make a perfect joint. The company has numerous letters showing that these packings have run over six years without renewal, and they claim that it is the cheapest packing on the market, as well as the lowest-priced metallic packing. A circular describing these packings will be furnished upon application to the Phenix Metallic Packing Co., 177 LaSalle street, Chicago.

TRADE NOTES.

Some months ago the B. F. Sturtevant Co. of Boston, in a neat little pamphlet entitled "Draft Without a Chimney," presented their experience with mechanical draft, and pointed out its salient advantages. The demand for information has necessitated the publication of a third edition, which has just been issued, and may be had upon application.

The Beaudry Champion power hammer, made by Beaudry & Co., Oliver street, Boston, is winning its way rapidly among concerns that have a great variety of work coming to the hammer all the time, in quantities that make the constant adjustment an impossibility, for the reason that more time would be spent adjusting the hammer than in doing the work. It has a range of capacity without adjustment that enables the operator not only to do the work quicker, but also in better shape as he "knows where it is" all the time, and can judge his work better. This and the fact that the ram is not held in place by springs, makes it particularly desirable for ship yard purposes, where a great variety of work in single pieces is continually being brought to the hammer.

A bit of news which we are pleased to record, both on account of the importance of the steamship concern under notice and because it shows the appreciation of a large concern for long and faithful service, devotion to duty, and a mastery of same, is the announcement that Mr. John S. Thomson, who is the assistant to Mr. M. F. Plant, president of the Plant System, has been appointed assistant manager of steamships with headquarters at No. 12 West Twenty-third street. In the absence of Mr. Plant, Mr. Thomson will always be found attending to the important duties that such an office demands, and, it is unnecessary to state, in just such a manner as to give complete satisfaction. Further comment on either the appointment or the Plant System is unnecessary. We wish Mr. Thomson continued success.—*Mercantile & Financial Chronicle*, Boston.

Mr. Holden, secretary of the Cleveland Sawmill & Lumber Co. states that there will be a shortage of white pine suitable for dockage and vessel purposes this winter. The supply of his company is short, Mr. Holden says, owing to the demand having exceeded anticipations when this year's cut was made. The scarcity of white pine is bound to increase yearly hereafter and higher prices will have to be paid. Oregon fir is overgrown, as a rule, and hence meets with little favor. Repeated attempts have been made to introduce it with little success, and there is a great deal of it that has been in dealers' hands so long that it is yard worn. Georgia pine contains within itself the elements that produce dry rot when exposed to the weather, and suitable timber is getting scarcer every day. When the present supply of white pine is exhausted, builders will have to use some other wood and there is some curiosity as to what it will be.

Ohio and Indiana game law—From Nov. 9 to Dec. 1, inclusive, excursion tickets for parties of three or more traveling together on one ticket at one fare for the round trip will be sold to points in western Ohio and Indiana on the Nickel Plate road. The immense quantities of small game along the line of the Nickel Plate road affords rare enjoyment to the sportsman.

168, Nov. 30

NEW SHIP BUILDING PROSPECTS.

Major C. F. Powell, United States engineer at Pittsburg, has prepared specifications for a new dredge, which it is claimed will be a decided improvement upon other similar boats on the river. The contract will stipulate that the boat must be completed by the end of May and it is expected to cost about \$50,000.

W. G. Rust, proprietor of the ship yard at Marcus Hook, near Chester, Pa., announces that he expects during the winter to build a yacht for a well known resident of Philadelphia. The boat will be 75 feet in length, 15 feet beam and 6 feet draught. Mr. Rust has recently placed several orders for ship building machinery and announces that he will ere long have a yard fully equipped to construct all kinds of passenger, freight and pleasure craft not exceeding 250 feet in length.

New York, Cuba & Mexico Steamship Co. is the name of a new corporation with principal offices at 28 North Seventh street, Newark, N. J. The capital is \$125,000 and the incorporators are William B. Palmer and Enoch A. Washburn of New York City, and Albert Searing of Newark, N. J.

The Cameron Steamship Co. of New York, has been incorporated with a capital of \$200,000 by J. S. Cameron, Walter D. Munson, Andrew W. Preston, Minor C. Keith, Henry P. Booth, Lamont G. Burnham and John S. Evans.

The Elizabeth Marine Ways, located near Pittsburg, will do all the boat building and repairing work for the new Ohio river coal combination, which is going into transportation affairs on a very large scale.

Capt. Ulster Davis of Rensselaer, N. Y., has just finished rebuilding his tug *Eugenia*, which was burned Aug. 9 on Lake Champlain. He has also contracted with Paul La Roux at Albany for the construction of a tug of 50 feet keel, 14 feet beam and 6 feet depth and to draw 4½ feet of water.

PNEUMATIC TOOLS IN DOCK WORK.

We have received from the Standard Pneumatic Tool Co., Marquette building, Chicago, a photograph showing their pneumatic boring tool at work on the cribs of the breakwater now being constructed at Buffalo, N. Y., by Messrs. Hughes Bros. & Bangs. The illustration shows well



the small size of the machine and its consequent ease of management and portability. It is being used with a seven-eighths bit 4 feet long, and the reversible feature of the drill enables it to back out of the hole very quickly. One-inch drift bolts are being driven in the holes bored by this machine, and the company has eight of these drills in use.

President Frank J. Firth of the Lake Carriers' Association, is a wonderful worker. He has watched, in the interests of lake vessels, the Sault power canal project, and has given up a great deal of time to correspondence with the officials of the canal company and with the war department, in order to safeguard the shipping interests. Now he is engaged in the task of preparing to have returned to the association if possible, through an act of the next congress, the sums paid by the vessel owners for private lights.

According to the annual report of Rear Admiral Hichborn, the present naval strength of the United States is 303 vessels, of which 215 are in the regular and eighty-eight in the auxiliary navy.

COMPREHENSIVE SCHEME OF NAVAL INCREASE.

BY A. M. BAILEY.*

The general feeling of the American people can be confidently assumed to be in favor of granting to the navy all that it can consistently ask. There are good reasons for believing this to be the case. For the first time since the war of 1812 the navy has been the predominant factor in our hostile operations. In the war with Mexico and in the civil war the navy was secondary to the army, and the present is the first occasion which the people have had in which to observe the worth of our naval forces, supplied with an effective fleet, equipped with the best guns and armor, and institute a comparison between its deeds now and in former times. The result has been satisfactory even to those who expected the most. There is not an occasion to be cited where the officers, men, vessels, and guns of our new navy did not do all that could be expected of them whenever opportunity offered.

All those who paid attention to the operations of the navy during the Spanish war and the shifts to which the secretary of the navy was put to find vessels for the work to be done, are fully convinced that we need not only a much larger fleet than we now possess, but that such navy should be divided into two separate and distinct classes, which we may call, for distinguishing purposes, the offensive and defensive fleets. The lack of a sufficient number of vessels for harbor defence in the first instance, and the failure to receive what little had been provided, owing to the necessity of using monitors and coast defence vessels on blockading and offensive duty, demonstrated our deficiency in defensive fleets, and the lack of efficient vessels for offensive purposes, even with the assistance of the coast defence fleet, when we could not spare one ship to threaten the ports of our foe across the Atlantic, conclusively show our crying need of more vessels suited to offensive operations. The necessity for a larger navy is not alone the outgrowth of our experience during the late war. Before that time it was generally conceded that we were not yet in such a strategical position as regards number of vessels of the various classes as would justify us in ceasing to add to our fleets. The great American habit of procrastination and failure to be ready till "the day after the fair" has kept us back, but aside from those who seem to be lost to all sense of patriotism in their wild hysterical shriekings about anti-imperialism, the worst procrastinator is now convinced that we must take time by the forelock and, as quickly as possible, get in a position to take care of our coasts, commerce and the additional great interests we have assumed as a result of the war. The lessons of the war, the need of providing suitable protection for our foreign territories, combine to impress seriously upon us not only the wisdom, but the absolute necessity of improving our naval strength in ships, guns and men as rapidly as possible.

The insufficiency of our present navy being admitted, what do we need to complete our present equipment? Here we find our best experts afraid to face the situation, fearing that the immensity of their demands will appall the people and result in nothing being done. It is of no use to expect anything unless the people fully realize the necessities of the case, and the sooner the situation is fairly faced and provision made for the systematic and regular addition of the vessels needed the better it will be for the navy, the people and the prospects of lasting peace. Just at this time, when the nation is most vividly impressed with the excellencies of what we have and the greatness of our needs, would seem to be the most opportune time to lay out a comprehensive scheme of naval increase, to be realized as fast as our means will allow.

NAVIES OF THE PRINCIPAL MARINE POWERS.

Before specifying our wants it will be as well to compare our existing fleet with that of the five or six principal nations of Europe and note how we stand in comparison with those of our neighbors with whom we are more or less apt to come in conflict.

VESSELS.	Great Britain	France	Russia	United States	Germany	Italy
Battleships, first class	44	18	11	12	6	10
Battleships, second class	21	18	7	1	10	2
Battleships, third class	9	..	5	..	..	3
Coast defence ships	21	19	17	23	19	3
Armored cruisers	15	4	5	2	2	5
Protected cruisers	19	10	4	17	2	..
Cruisers, 2d and 3d class	104	20	16	3	3	14
Gunboats, seagoing	48	36	29	16	17	17
Gunboats, river	54	31	41	..	15	8
Torpedo boat destroyers	96	18	21	16	11	18
Torpedo boats, first class	78	112	85	27	109	110
Torpedo boats, 2d & 3d class	112	138	130	8	33	84

Auxiliary vessels, despatch boats, colliers, etc., are omitted, but their enumeration would show the United States to be still further behind than the above list would indicate. Here we stand fourth in the naval powers by a very small margin, with Germany and Italy running us a very close race, and, with the German programme of increase taken into account as against our own, the knowledge that in three or four years Germany will be ahead of us. In enumerating below what is considered our necessities for the protection we require and the proper vessels to be assigned to the defensive and offensive fleets, it should be borne in mind that this is not a scheme for a year or two, but is laid out as a comprehensive plan to take a minimum of fifteen years for its accomplishment, and allowing for the dilatoriness of congress, a probability that at least twenty years will be required to realize it in full, if at all. It is better to lay out a good and as near as possible perfect system, than a poor one devised for temporary emergencies.

PROPOSED DEFENSIVE NAVY.

Defence being more important than offence, and no nation in fact being in a position to take the offensive until its defences are in order for its protection, let us lay out first our scheme of defence.

The United States has an enormous extent of seacoast on both the

Atlantic and Pacific oceans to protect. It would seem that the best way to do this will be to divide the various sections into zones, to which arrangement the situation of our principal cities naturally lends itself, and then provide for an outer and inner line of defence and scouts for each zone. The following is suggested as the best disposition of ships and arrangement of zones to meet our requirements:

DEFENSIVE FLEET, ATLANTIC COAST.

Zones.	Ports.	Monitors	Battleships	Cruisers.	Destroyers.	Torpedo Boats
1	Eastport.....	1	2	2	2	2
	Bangor.....	1				2
	Portland.....	1				2
	Portsmouth.....	1	4	4	2	2
2	Boston and vicinity.....	3				4
	Newport	2				2
	Head Long Island Sound.....	2	2	4	4	2
3	Long Island Sound.....	2				8
	New York Harbor.....	2				4
	Delaware Capes.....	4	2	3	4	8
4	Chesapeake Bay.....	4				2
	Wilmington.....	1				2
	Port Royal.....	2	2	2	2	2
5	Charleston.....	1				2
	Savannah.....	1				2
	Brunswick.....	1	2	2	2	2
6	Key West and vicinity.....	..				2
	Tampa.....	1				2
7	Pensacola.....	1	1	2	2	2
	Mobile.....	1				2
	Mouths Mississippi	2				2
8	Sabine Pass.....	1	4	4	2	2
	Galveston.....	2				2
		37	24	23	18	60

DEFENSIVE FLEET, PACIFIC COAST.

9	San Diego.....	1	2	1	1	2
10	San Francisco.....	2	4	3	2	4
11	Columbia river.....	2	2	2	2	4
12	Puget Sound.....	4	2	3	4	4
		9	10	9	8	14
Total Atlantic Coast.....		37	24	23	18	60
Total Pacific Coast.....		9	10	9	8	14
Total Defence fleet.....		46	34	32	26	74

A study of the provision made for each port and zone will show that the aim has been in all cases to provide a minimum of one monitor and two torpedo boats to each port and if not an ample, at least a fair supply of battleships, cruisers and destroyers to the different zones. The monitors and torpedo boats will act as advance guards to the land defences at each port, for it is now a well-appreciated fact, that an auxiliary defence at some distance seaward from the land defences is an important and necessary part of the proper protection of a port, to engage, and, if possible, disable the enemy before he has a chance to attack the defences at the port, and later to reinforce the work of land batteries. The torpedo boats can do their special work and get closer to the object to be attacked under the wing of a monitor and stand a better chance of sinking the enemy than if obliged to proceed to the attack alone. To each zone has been allotted one or more battleships, proportionate to the importance of the zone. These vessels are intended to cruise off shore, at or near the middle of the zone to which they may be assigned, and, upon being informed by the scout cruisers of the approach of an enemy, to reinforce the station monitors at the point destined for attack. The cruisers designed for scout service should have high speed and large coal capacity so that they can stay at sea for long periods, and, within their respective zones, detect the approach of a hostile fleet, and then warn, first, the battleships of the zone, secondly, the point threatened. Heavy armor or armament is not needed on these ships, which require rather large steaming radius and great speed than fighting capacity. The uses of the destroyers and torpedo boats need no explanation. The division into zones and allotment of vessels of each class to the different zones, it is believed, will commend itself to the impartial student as being fair to all and affording to each place the importance its position to the country demands. Certainly the principle here laid down must be approved, for no one can gainsay that the destruction of the smallest port we have enumerated in this list would be more expensive than the cost of the entire number of vessels herein provided for; and when that factor receives proper consideration the size of the defence fleet required will not seem so great. At the present time to meet the demands of such a fleet we have on hand: Monitors, 23; Battleships, 13; Scouting cruisers, 2; Torpedo boats, 35.

None of our destroyers is yet in commission, and those under construction we have attached to our offensive fleet, where they would seem to be more urgently needed. The battleships take in all under construction at this time; the monitors, the relics of the civil war, and those now built and contracted for; the scouts are the Minneapolis and Columbia. We have, therefore, still to provide for our defensive fleet the following, viz:

	Monitors.	Battleships.	Scouting Cruisers.	Destroyers.	Torpedo Boats.
Needed	46	34	32	26	74
On hand	23	13	6	..	35
Required	23	21	26	26	39

*Reproduced from the New York Sun.

The best method of providing for these will be considered in connection with the provision for the requirements of the offensive fleets.

THE OFFENSIVE NAVY.

When we come to consider our requirements for an offensive fleet we find entirely different conditions confronting us. This fleet is to the defensive what the regular army is to the militia. It must be strong in attacking power, able to carry a large supply of coal, stores and provisions, and each squadron must be of sufficient strength to hold its own against any enemy it is likely to encounter. A navy, deficient in vessels, guns, men or material, is worse than no navy at all, as it will be a source of weakness instead of strength when it is most needed. For this reason I have laid down as our actual, necessary requirements for a fairly adequate offensive navy the following:

DIVISIONS.	Battleships	Armored Cruisers.	Protected Cruisers.	Unprotected Cruisers.	Gunboats.	Torpedo Boat Destroyers
North Atlantic fleet	4	8	8	2	4	12
South Atlantic fleet	2	6	6	2	4	6
European or general fleet.....	2	6	4	4	..	12
Northern Pacific fleet	4	6	6	6	4	10
Southern Pacific fleet	2	4	2	1	4	4
Asiatic fleet	6	10	8	5	10	20
Reserve or flying fleet.....	4	10	10	..	..	20
	24	50	44	20	26	84

The above list calls for the least number of vessels of each class that the necessities of our position require. It is easy to find where a vessel of one class should be added here, one of another there; that protection is not provided for this place or that, nor for convoys; but I think it impossible for the most severe critic to find a spot where one can dispense with a single vessel without actual danger to our interests as they now exist. We have available at present, of the various vessels enumerated above:

Battleships .....	..
Armored cruisers	2
Protected cruisers	15
Unprotected cruisers	10
Gunboats	16
Torpedo boat destroyers	16

It has been stated that the principal qualities needed in our offensive fleet are: Great fighting capacity; large radius of action; superiority in fighting quality to enemy; speed superior to enemies' vessels; number sufficient to cover and protect our interests. To achieve this our main reliance must be on our battleships and armored cruisers, with a complement of destroyers. Protected cruisers, second and third class cruisers, and gunboats are needed for convoy, scout and special duty, and for the ordinary work of times of peace, and no navy would be in condition to cope with an enemy without a proper supply of these classes, but the strength of the fleets will lie in the efficiency of the battleships and armored cruisers. The present opinion of naval constructors, and our own experience in the late war, convince us that battleships should be of 12,500 to 15,000 tons, of at least 18 knots speed, of great coal capacity, and furnished with the best armor and guns obtainable. Armored cruisers should be about 12,000 tons, 22 knots speed, large coal capacity, with best gun power and armor attainable with their other requirements. Protected cruisers, 6,000 to 8,000 tons, 18 to 20 knots speed, fair gun power, and large coal capacity. Unprotected cruisers 2,000 to 5,000 tons, 16 to 20 knots speed, good coal capacity, and such armament as their size warrants. Gunboats, 1,000 to 1,800 tons, 15 knots speed, light draught (not over 12 feet), and best coal capacity and armament possible. Destroyers, 500 to 800 tons, 35 knots speed, good sea boats, and as large a coal capacity as can be managed. Of the battleships needed we have, strictly speaking, none on hand, and all will have to be built. If some of those now under construction are used for the offensive fleet, their place would have to be supplied in the defensive, so it is the same thing to count them there and as lacking here. The two armored cruisers we have are fine vessels of their size, but are not large enough in view of the kind other nations are building. The three ordered at the last session of congress will be of the right kind, however, to compete with any now built or building for any of the other powers. Our fifteen protected cruisers are good boats and will answer in this class, although smaller in tonnage than we require. Our unprotected cruisers and gunboats are suitable for their classes, and the sixteen destroyers now building are just what we shall want for the offensive fleet in size and speed.

WHAT WE HAVE IN BOTH SECTIONS OF THE NAVY.

We find then that for both sections of the navy the vessels on hand and needed are as follows, viz:

	Monitors.	Coast defence battleships.	Sea going battleships.	Armored cruisers.	Protected cruisers.	Scouting cruisers.	Unprotected cruisers.	Gunboats.	Torpedo boat destroyers.	Torpedo boats.
Number needed	46	34	24	50	44	32	20	26	110	74
Number on hand	23	13	00	2	15	2	10	16	16	35
Number to be built.....	23	21	24	48	29	26	10	10	94	39

This makes a total of 191 vessels yet to be built, and 133 destroyers and torpedo boats. The unthinking will laugh at the idea that the United States can need any such force for the protection of its coasts, foreign dependencies and trade relations with other countries; politicians will stand aghast at the money required to be voted for such a purpose, which they would not mind probably did they not fear it would not be approved by their con-

stituents. Let all the dissidents sit down and think the question over calmly and rationally. Try to pick flaws in the above estimate of our needs and arrange a schedule of our wants to cover your own idea of the needs of the country. Take our extent of coast line, are the requirements of the defensive fleet overestimated? If so, where? Which one of the ports enumerated would you leave without the protection specified or lessen the number of vessels assigned. For most of the ports one monitor and two torpedo boats are provided. Is this too much naval protection to reinforce the land defences and act as a first line of battle to draw out the strength of any attacking force and (the torpedo boats) serve as the destroying agency of the enemy? The monitor will retire as the foe advances and become eventually an integral part of the land defences with the advantage that it can be moved from point to point as may be found necessary or advisable. The points where more than one monitor are suggested, as Boston, New York, etc., are such as the most careless observer must see require more protection and of the kind offered by a floating battery. The wide sweep of Massachusetts bay, the large number of small towns situated upon it, can only receive adequate protection from a force of monitors, and more rather than less should be stationed there. The importance of New York justifies the assignment made there and so with the other places in the list. The problem of proper defence can be met in no other way than by a suitable number of monitors and torpedo boats capable of navigating in still waters and practically indestructible. The defence line of battleships may be omitted by the over bold. Their usefulness and importance must be admitted, nay emphatically asserted, if we are to undertake to guarantee our ports from bombardment; but if we do not undertake to prevent any attack, but aim only to resist one that is made, we can omit most of the battleships provided. So also we can dispense with the scouting cruisers. The omission will be costly in two ways: first, it is likely to result in the serious damage of some of our coast towns, involving a larger expense than would result from the construction of twice the number of defence ships here suggested; second, in the grave loss to the offensive fleet by the withdrawal of its vessels to act as a defence to seaports, for we can feel assured that the same alarmist feeling that depleted our navy during the last war would arise again and political influence would once more compel the administration to divert the vessels of the navy from their proper and regular duty. In the first case cited the loss would fall, unless congress came to the rescue, upon the city or town suffering the attack, and would be a most unjust division of the punishment resulting from the neglect of the whole country. If, therefore, the line of battleships and scout cruisers is not to be provided, it should be plainly laid down by law that the vessels of the offensive fleet are not to be used for defensive purposes under any consideration during hostilities with another power. While the last scare or fear of a bombardment by the fleet of Spain was silly in the extreme, it is safe to assume that our next war will be with some power far stronger than Spain, one with more ships to spare for attacking our coasts, raising a much greater feeling of alarm and far greater demand for coast protection. The diversion of the offensive fleet cannot be permitted under such circumstances, even if it was during the last war, and congress must look this fact squarely in the face. Of course, the battleships that we have at present, though not properly—most of them—sea-going ships, will have to serve in the offensive fleet until such time as they can be relegated to their proper duty and place, and the excuse that they are coast line battleships will not serve to take them out of the offensive side of our naval forces. They must be used for offensive purposes for some years anyway until we can get a sufficient number of sea-going ships of the first class to do duty on the offensive force, and until we can get ten or twelve first-raters afloat we must pray to be delivered from the danger of war.

NO PLACE TO CUT DOWN ESTIMATES.

In the offensive fleet the most careful scrutiny cannot find a place in which to pare. The North Atlantic fleet will be charged with the duty of sweeping the Atlantic and protecting our commerce there and our West Indian possessions and Cuba. In its charge will be the great ocean highways from Europe to our shores and the protection of Porto Rico and Cuba as well as the Gulf of Mexico. Its strength as laid down will not be sufficient for its needs against the French or Russian fleets, or even the German, as it will be in five years, and it would be found necessary to reinforce it from the European and reserve fleets in such a case. The South Atlantic fleet will have charge of our interests on the east coast of South America and the west coast of Africa, and the extent of territory it will have to cover could not be properly done in war time by twice the number of vessels. The European fleet would be the invading or aggressive one, and for special operations it would have to draw from the others instead of giving to them a part of its strength, and without a large reinforcement, would not be equal to an attack against the land defences of any continental nation. As a nucleus, however, it could be used to make feints, keep a force of vessels of other nations at home to protect their shores against it, and maintain our power on the high seas. The Northern Pacific fleet will have the care of our western coast, Alaska and Hawaii. It would have about as much work in proportion to its size as the North Atlantic fleet, and work fully as important. The Southern Pacific fleet would have commerce and interests in those seas to protect and might also be charged with the care of Samoa. The Asiatic fleet will have the greatest task of all. It is, therefore, made the strongest numerically and in fighting capacity. Westward the course of empire has taken its way until it has gone so far that it seems to be about to recommence at the far East the conquest of the world. China, the prey of all nations, teeming with a vast population, desired by all as a trading place for manufactured goods, is surrounded by a lot of wolves waiting to tear a strip of territory from its worn-out grasp. Japan is raising herself to a high place in the councils of the world, and we have assumed responsibilities in the Philippines that must be carried out at any cost. With all these interests to protect and our new possession of Guam, the size of this fleet should be increased largely. It is useless to expect this, however, for many, many years, and the Dewey of his day will be obliged to equal if not surpass the deeds of the hero of today by reason of his still more inadequate allotment of vessels to compete with the superior forces of our foes. The vessels as-

signed to the reserve fleet are few, and liable to be needed twice over in case of actual hostilities.

It must be borne in mind that the programme here outlined covers a period of some years. There should be no two opinions as to what we most need. Emphatically our greatest lack is in battleships and armored cruisers; the comparison of our stock of these classes with that possessed by other nations shows this without possibility of argument; and when we note the rate at which the other great powers are adding to their stock of these vessels we must conclude that we want them badly. If we undertake the construction of a certain number of vessels of each class every year, laying down a definite programme to be followed without diminution each year, and if we include in this programme three battleships and three armored cruisers every year, it will take eight years to get under construction the number of battleships we need for the offensive fleet, and sixteen years for the last of the armored cruisers and at least three years more in each case before the last one is in commission. We should not fail, therefore, to include in any plan of naval increase for the next eight years three sea-going battleships, and for sixteen years, three armored cruisers. Next in order will come the provisions for protected cruisers for chasing the commerce of an enemy, convoying our own merchant vessels and communicating with our foreign dependencies. Needing twenty-nine of this class of vessels, if we build one each year for ten years and two each year thereafter for five years, we shall still be nine short of the number required. Our coast protection must be considered at the same time and provision made for gradually acquiring the vessels needed for that purpose. Needing twenty-three monitors and twenty-one battleships we should order one of each class every year until the number is complete. As it is altogether likely that our merchant marine will receive accessions of a class of vessels suitable for scouting cruisers, we may defer any provision for them. In destroyers and torpedo boats we are lamentably weak, and, while the necessity or usefulness of these boats is not assured beyond possibility of doubt, we should supply ourselves with a reasonable number to use as a protection against those of other nations. We should build ten destroyers per year for the next five years and five per annum after that time and say five torpedo boats per annum until we get the number needed. Based on these lines the construction programme would be about as follows, viz.:

FOR FIRST FIVE YEARS, EACH YEAR.

3 sea-going battleships at \$3,500,000 each.....	\$10,500,000
1 coast defence battleship	3,000,000
1 monitor	1,500,000
3 armored cruisers at \$4,000,000 each.....	12,000,000
1 protected cruiser	2,100,000
1 unprotected cruiser	1,000,000
1 gunboat	250,000
10 destroyers at \$300,000 each.....	3,000,000
5 torpedo boats at \$150,000 each.....	750,000

Per year for five years.....\$34,100,000

Armor and armament would be additional and make the total appropriation required in the neighborhood of \$50,000,000 each year.

SIXTH, SEVENTH AND EIGHTH YEARS.

Same as above, less 5 destroyers each year.....\$32,600,000 97,800,000

NINTH AND TENTH YEARS.

2 coast defence battleships.....	\$3,000,000	\$6,000,000
2 monitors	1,500,000	3,000,000
3 armored cruisers	4,500,000	12,000,000
1 protected cruiser	2,100,000	
1 cruiser	600,000	
1 gunboat	250,000	
5 destroyers	300,000	1,500,000

Per year for 2 years.....\$25,450,000 50,900,000

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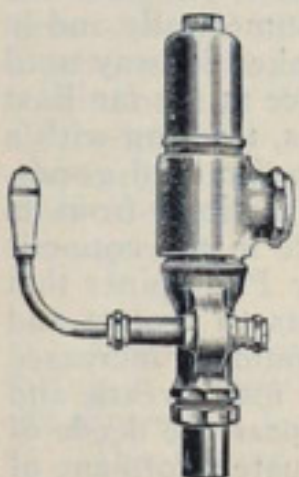
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2 coast defence battleships	\$3,000,000	\$6,000,000
2 monitors	1,500,000	3,000,000
2 protected cruisers	2,100,000	4,200,000
3 armored cruisers	4,000,000	12,000,000
5 destroyers	300,000	1,500,000

Per year for 3 years.....\$26,700,000 80,100,000

FOURTEENTH YEAR.

1 coast defence battleship.....	\$3,000,000	\$3,000,000
2 monitors	1,500,000	3,000,000
3 armored cruisers	4,000,000	12,000,000
2 protected cruisers	2,100,000	4,200,000
1 scout cruiser	2,000,000	
5 destroyers	300,000	1,500,000
		25,700,000

FIFTEENTH YEAR.

2 coast defence battleships.....	\$3,000,000	\$6,000,000
3 monitors	1,500,000	4,500,000
2 protected cruisers	2,100,000	4,200,000
3 armored cruisers	4,000,000	12,000,000
		26,700,000

Total expenditures in 15 years.....\$451,700,000

Add 1/3 for armor and armament, say.....148,300,000

Total\$600,000,000

An average of \$40,000,000 per year for the next fifteen years for the increase of the navy.

This programme leaves at the end of fifteen years three armored cruisers and nine protected cruisers to be built, all of which can be laid down in one year without exceeding the annual sum allowed for each year by more than \$5,000,000, or the whole can be divided into two years and one or two other vessels built each year. The average of forty millions per annum for fifteen years is certainly a good round sum, yet, compared with the amounts European nations are spending on the increase of their naval establishments, it is not a large amount. Some are spending as high as fifty to sixty millions per year and it is an open question whether our expenditures on the scale here indicated are sufficient to place us in as good a relative position as that we now occupy. With that, however, we need not concern ourselves; the large expenses here suggested are all we can afford and will be sufficient to put us in a good position to say the least. With the amounts required from time to time for repairs and renewals and for incidentals, as yard and docks, we shall be spending a very large sum on the navy.

WAYS AND MEANS FOR THE INCREASE.

Ways and means for this increase are now to be considered. The work here outlined is certainly for the good of the whole country and especially for the advantage of posterity. It would seem that such an important work as is here being considered is one where a great part of the cost could fairly be saddled upon those who will receive the greater part of the benefit. Especially as we are still engaged in paying pensions to those who defended the country during the civil war does it seem fair that the whole of the first five years' expenses should be provided for by an issue of bonds for the sum needed each year on account of "increase of the navy." After five years it is altogether possible that a very large part of the present pension list will drop off rapidly, and by that time a part, possibly half, of the yearly expenditure could be paid from the yearly revenues without unduly taxing the people. There is one other way in which the necessary increase can be in part provided without any tax on the general government. If each one of the states and territories would undertake to furnish at least one battleship, armored cruiser, or monitor, according to population and means, we should acquire our navy at a much earlier date, with less friction from economical lawmakers, and add largely to the popular interest in the navy as a patriotic branch of our national

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life. Under such a plan New York and Pennsylvania could give two battleships, or one battleship and one armored cruiser, or two armored cruisers; other states, in proportion to their population and wealth, contributing one battleship or armored cruiser or a smaller vessel. Rhode Island could manage a protected cruiser at least, and no state but what can do as much as that, even if it has to issue short term bonds in payment of the cost. The plan is patriotic, feasible and a time saver. It would tend to stimulate the liberality and patriotism of the interior states, and, if properly presented by congress to the states, could hardly fail to secure prompt and favorable action.

To provide a suitable number of officers and men will not be hard. An increase in the number of cadets at the naval academy will supply the officers, and the popularization of the navy by having each state provide a vessel, would tend to furnish a good number of seamen from the interior. In time of peace 5,000 to 20,000 men would be the maximum number needed, as the majority of the vessels of the offensive fleet would be laid up in ordinary, with caretaking crews only, and all of the vessels of the defensive fleet either in ordinary or in charge of the naval militia of the various states. It could be made a sine qua non before a monitor was provided for any port, that such place should provide a sufficient number of officers and sailors to take charge of it or them, as the case might be. Any seaport would be able to provide a crew for one monitor, and the state in which a port or ports were situated could no doubt furnish enough naval militia to man the defence fleet allotted to that section. All vessels being sheathed and coppered, they would need no fresh water station in which to lay up, and frequent dockings would not be necessary, while the fleet of destroyers and torpedo boats can be hauled out of water and kept under cover at the various navy yards, save as required to be used to practically teach torpedo boat work to young officers. The increase in the navy will be gradually needed and no large number will be required in one year. The personnel act will provide a good number of officers for command; rank and additions can be made as needed. We require one thing, however, we are not likely to get, and that is a supply of high ranking officers—admirals and vice-admirals. We should have at least one admiral and three vice-admirals, with a sufficient number of rear admirals to fill the important sea and shore commands. The admiral should be the technical commander-in-chief of the navy on duty at the department as the official adviser of the secretary, and two of the vice-admirals should be on duty at sea, one on the Asiatic station and the other wherever an officer of his grade should be found most needed from time to time. The necessity for this lies in the fact that other nations have their important fleets on foreign stations under the command of a vice-admiral, and we should be in a position to demand for our fleets and commanders all the courtesy and consideration afforded to any nation, and at the same time have an officer of as high a rank as any he is likely to meet with on the station, so that his opinions, counsel and wishes may carry as much weight as those of others. It is really more necessary that we should do this than that we should have ambassadors instead of ministers, for our

naval commanders are generally in a position where they are forced to deal with people who are susceptible to the influence of titles and without the assistance of diplomats or regular diplomatic proceedings. The expense is a mere trifle, and the exalted rank is worthy the magnificent officers we have educated and entrusted with the command of our floating fortresses.

The increase of the navy demands provision for its care and repair. We are now about as ill equipped with yards and docks as possible, and the docks lately ordered are not, in some instances, of a permanent order. For durability we need stone dry docks and plenty of them. Each navy yard should have at least one large enough to take in the largest class of ships and two others capable of taking each two of the smaller vessels, so that five ships could be docked if necessary. The cost for maintenance of a properly constructed dry dock is practically nothing and its need is great in time of war. Proper defences have to be provided for our foreign naval stations as well as those at home and a suitable force provided to defend them. The marine corps is the proper body to be charged with this duty and it should receive such additions to its rank and file as will enable a sufficient number to be detached at the various stations for proper care and protection.

The habitual procrastinator argues that we have plenty of time in which to get ready for our next war. The over-confident citizen who thinks we can whip any nation under the sun, does not see the necessity for prompt action, but surrender to the desires of either class is liable to leave us in a serious position at any moment. It is true that we awakened the envy and admiration of the world by the conduct of our navy during the war with Spain. Other nations, however, feel confident that they could give a better account of themselves than did the Spaniards, and this is no doubt true. The feeling of respect we created will not stave off hostilities, and the present conduct of certain foreign nations indicates that ere long they or we must do some giving in. As we feel that we have excellent grounds of offence against some, and as the differences are sure to be over trade questions, where neither power will care to give in without a trial of strength, the danger of collision is great. Our motto should be "Ready, aye Ready" for whatever enterprise may come to us in the future, and the people should see to it that the politicians provide the sums needed to place the navy in a state of preparedness to take advantage of any exigencies that may arise.

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THE CANADIAN WRECKER SAGINAW
STATIONED AT DETROIT, MICH.
ENABLES US TO WRECK IN CANADIAN
WATERS

STEAM PUMPS AND SUB-MARINE
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4 STEAM PUMPS, 10 JACKS, 3 HAWSERS.

1899		November							1899	
SUN.	MON.	TUE.	WED.	THU.	FRI.	SAT.	SUN.	MON.		
..	..	..	1	2	3	4	..	..
5	6	7	8	9	10	11	12	13		
14	15	16	17	18	19	20	21	22		
23	24	25	26	27	28	29	30	..		

1 COAL and ORE PUMP
3-12 INCH ROTARY
1-14 INCH WORTHINGTON.

DIVING RIGS
AND
DIVERS
ABOARD
AT
ALL TIMES

10-100 TON JACKS
1-12 INCH HAWSER
1-10
1-9

TELEGRAPH
PARKER & MILLEN,
DETROIT, MICH.

Capt. MARTIN SWAIN,
CHEBOYGAN, MICH.

U. S. Engineer Office, Milwaukee, Wis.,
Nov. 14, 1899. Sealed proposals for building
Crib Breakwater at Sheboygan Harbor,
Wis., will be received here until 12 o'clock
noon, standard time, Dec. 14, 1899, and then
publicly opened. Information furnished on
application. J. G. Warren, Capt., Engrs.
Dec. 7.

U. S. Engineer Office, 1637 Indiana Ave.,
Chicago, November 2, 1899. Sealed proposals
in triplicate for constructing three miles or
less of Feeder of Illinois & Mississippi Canal,
from mile 9 to 11, inclusive, near Tampico,
Ill., will be received here until 12 noon, cen-
tral time, December 2, 1899, and then pub-
licly opened. Information furnished on
application here, or to Assistant Engineer
L. L. Wheeler, Sterling, Ill. W. L. Mar-
shall, Maj., Engineers. Nov. 23.

U. S. Engineer Office, Montgomery, Ala.,
October 20th, 1899. Sealed proposals for
building a sea-going hydraulic dredge will
be received here until 12:00 M., November
22d, 1899, and then publicly opened. Infor-
mation furnished on application. C. A. F.
FLAGLER, Capt., Eng'rs. Nov. 16.



Steamboat Fuel at Ashtabula. LARGE SUPPLIES OF BEST QUALITY.

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Times.



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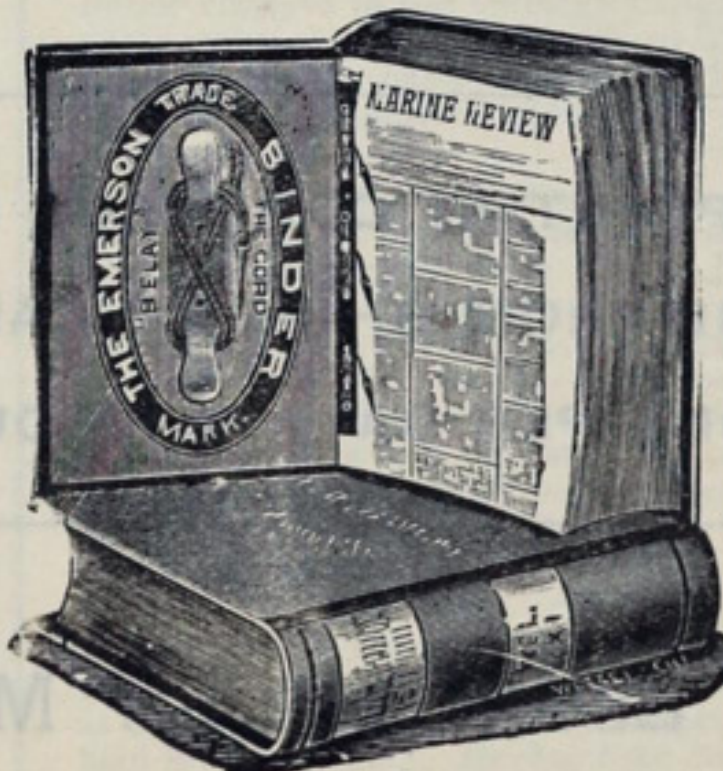
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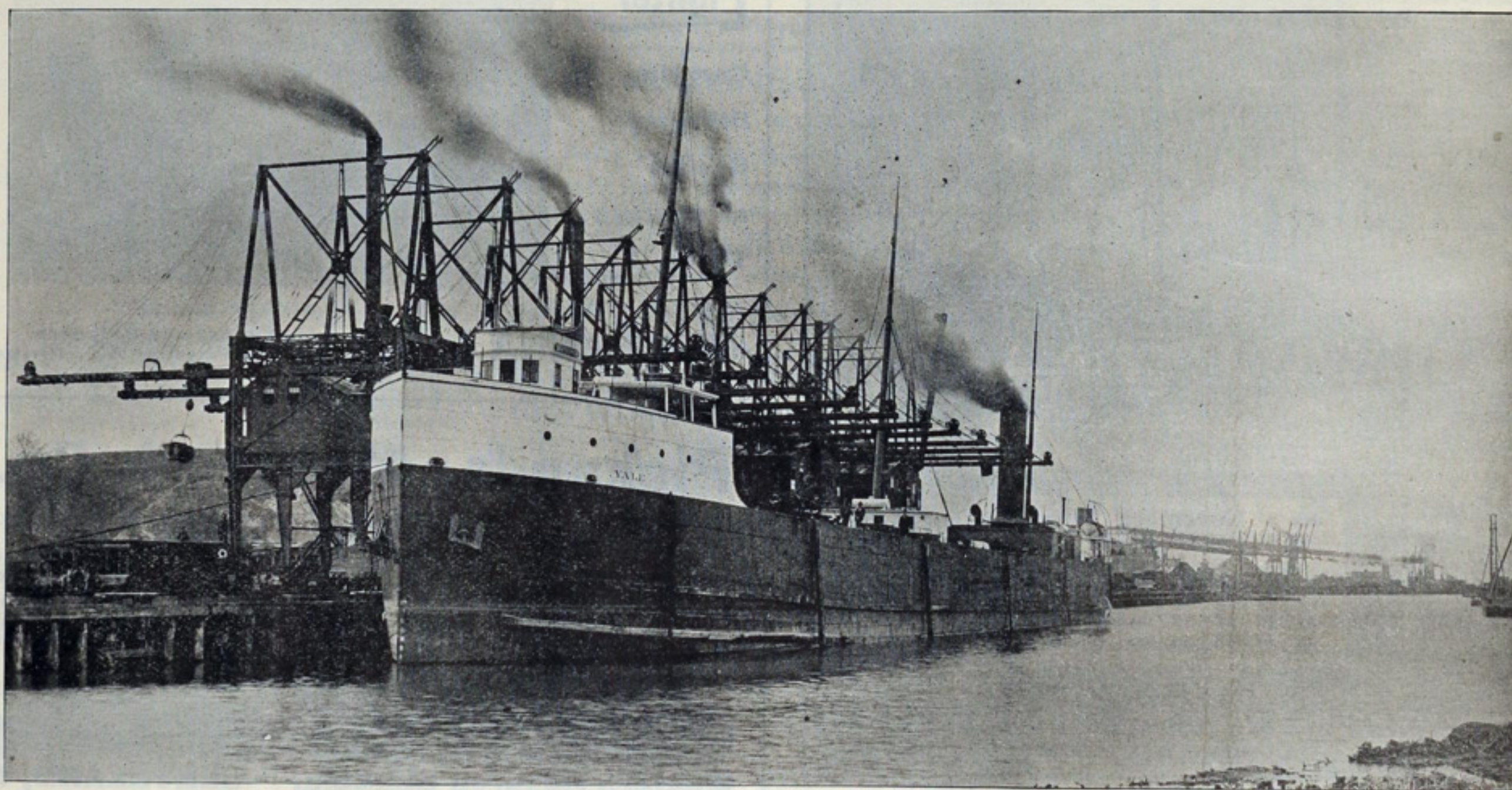
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AND UNLOADING OF**
Coal and Iron Ore.

HIGHEST DEVELOPMENT OF CAR DUMPING MACHINES.



Modern Ore Dock Equipment at Conneaut, the Carnegie Harbor on Lake Erie.

View from water side of McMyler direct ore unloaders—Steel Steamer Yale, ore carrier of about 5,000 tons capacity, at dock.

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